NSPW Responses to Agency 02/15/08 Comments
Draft Feasibility Study (FS) Report
Dated October 29, 2007
Ashland/NSP Lakefront Superfund Site
May 15, 2008

General Comments:

1. More cohesion must be maintained between the text and the figures. In particular, the figures should show and label all of the key components of each alternative, even if existing facilities or extraction wells are used.

Response

Revisions have been made to figures and text to clarify issues in response to Agency comments.

2. The draft as submitted was difficult to review due to the lack of detail in the descriptions, drawings and cost estimates. Detailed descriptions of options and combined options that are applicable to an area need to be included accompanied by drawings and cost estimates. As the effected areas/media of the site are connected and any remedial action in one area will have to be coordinated with actions at other areas a "whole site" view needs to be added. It is difficult to determine how actions taken in one area will impact actions taken in another area.

Response

As directed by USEPA since 2003, the Work Plan, RI Report, technical memoranda, and FS Report have consistently addressed Site Contamination by media (soil, groundwater, and sediment), rather than by "operable unit". Based on agreements reached at a meeting among NSPW and the agencies on March 3, 2008, four operable units or areas (filled ravine, Copper Falls aquifer, Kreher Park, and off-shore sediment) were identified in previous reports, and a new section has been added to the FS describing how the selected response actions will be integrated. Nine remedial scenarios addressing proposed remedies at all four areas are described in Section 9.0 of the revised draft FS.

As an example, many of the remedial options reviewed for soils, groundwater and sediments contain a wastewater handling component. The FS seems to minimize the extent of that wastewater handling component. The FS relies on discharge to the City of Ashland wastewater treatment plant. In light of the potential volume of water associated with pumping and treating groundwater from the Copper Falls aquifer, de-watering during soils excavation and sediment removal and de-watering and storm and surface water management, a much more thorough discussion of the wastewater component needs to be included in the FS. It should address expected flows from a combination of actions, evaluating technologies, costs and discharge points.

Response

Based on agreements reached at the March 3, 2008 meeting, NSPW will provide estimates of wastewater generation for various potential remedial responses based on local climate and water budget data. These estimates are provided despite the lack of pump test data -- typically gathered during the RD/RA phase -- from Kreher Park, the area where the greatest volume of wastewater is likely to be generated during the remedial action.

3. Confined Disposal Facility (CDF): Under the National Contingency Plan, 40 C.F. R. 300.430(e), the FS must present a detailed analysis of the alternatives that represent viable approaches to remedial action. The analysis of alternatives must consider nine evaluation criteria at 40 C.F.R. 300.430(e)(9)(iii). In selecting a remedy, EPA must first consider the threshold criteria: overall protection of human health and the environment, and compliance

with Applicable or Relevant and Appropriate Requirements (ARARs), 40 C.F.R. 300.430(f)(1)(i)(A). CERCLA Section 121 requires selection of a remedial action that is protective of human health and the environment. EPA's approach to determining protectiveness involves risk assessment, considering both ARARs and to-be-considered materials (TBCs). There is not enough detail in the draft FS to determine if a CDF is a protective remedial alternative and complies with ARARs at the Site. As put forth in the FS by NSPW, a CDF in Lake Superior will have to be protective and meet the stated ARARs. The NR 500 series of the Wisconsin Administrative Code is an ARAR for this alternative because a CDF which contains dredged material and solid waste is a solid waste disposal facility. Landfill location, performance, design, and construction criteria will have to be met along with all other applicable provisions of the NR 500 series Administrative Code. This is a lack of detail in the draft FS on how a CDF meets these performance, design, and location-specific ARARs.

In addition to the threshold criteria requirements, EPA must consider the primary balancing criteria and modifying criteria in 40 C.F.R. 300.430(1)(i)(A) and (B). The primary balancing criteria include long-term effectiveness and permanence, implementability, and cost, and the modifying criteria includes the State and community acceptance. The FS does not provide enough detail to evaluate the CDF alternative under these criteria, and serious issues have been raised as to whether a CDF is a viable alternative. Wisconsin Department of Natural Resources (WDNR) has continued to outline the potential difficulties NSPW will encounter in trying to obtain the appropriate authorization of a CDF. The legal authority to create a CDF on the lakebed raises questions of implementation as well as State and community acceptance. The mechanisms to authorize a CDF appear to be a lakebed grant from the Wisconsin Legislature, a "bulkhead line" under Section 30.11, Wisconsin Statutes, by the City of Ashland, or a submerged lands lease to the City from the Board of Commissioners of Public Lands for the purposes specified in Section 24.39, Wisconsin Statutes. These mechanisms require a finding that the proposed fill is in the "public interest" or enhances a public trust purpose, and would require the cooperation of the City of Ashland. Until a CDF is authorized, this alternative may not be viable, and the FS does not present a plan to obtain such authorization. In addition, recent proposals to construct new, or expand existing CDFs in Wisconsin have been unsuccessful due to the inability to engineer a facility which can be assured to be suitable and stable for the long term and to withstand the public opposition to the facility. Many proposed CDFs fail to take into account the actual costs associated with engineering, constructing and maintaining the facility. There are also concerns that the proposal calls for the CDF to accept on land solid waste which will create a landfill in the waters of the state.

While NSPW may evaluate the feasibility of a CDF as part of the FS, it is unclear whether this option is viable given the remedy selection criteria at 40 C.F.R. Part 300.430(f). The protectiveness of the remedy and compliance with ARARs, as described in the previous discussion and correspondence, are threshold criteria, and the long-term effectiveness and permanence, mobility, implementability, and cost are balancing criteria, and State and community acceptance are modifying criteria, all of which will impact the viability of a CDF. The FS should address all of the criteria in greater detail in order for EPA to properly evaluate the CDF alternative.

Response

As discussed at the March 3, 2008 meeting, the CDF remedial options will be retained and more detail will be added to the FS concerning the steps taken to pursue regulatory approvals for the CDF. This includes a discussion of the following: Process ARARs subject to CERCLA preemption pursuant to CERCLA §121.

1) ***NR 504 landfill siting exemptions(as opposed to siting criteria) for an upland CDF;***
2) ***A lakebed fill permit issued pursuant to paragraph 30.12, Stats; or***
3) ***A legislative lakebed grant; and/or***
4) ***A lease with the Board of Commissioners of Public Lands***

4. The soil, groundwater and sediment sections comparison of potential remedial alternatives tables should be changed to a numeric system. The use of one type of Table system for groundwater and soils and a different Table system for sediments can be confusing to the reader. NSPW drops the community acceptance and agency acceptance from the sediment table. Both community and agency acceptance are required criteria for sediments just as they are for groundwater and soils. NSPW should revise all three tables to include all criteria and assign a numeric scale for each option which is more accurate and useful rather than the "high, medium, low" that is currently being used. This table format should be carried through all sections.

Response

Based upon the discussions at the March 3rd meeting, the community and agency acceptance criteria has been removed from all tables and the rankings remain "high", "medium" and "low".

5. **Soils** - Add an alternative that includes the removal of contaminated soils within the ravine south of St.Claire Street including the historic MGP structures and all areas that exhibit free product. In addition, add a Kreher Park, hot spot removal (waste tar dump/seep area and piping trace to the west) and containment for Kreher Park with groundwater control and treatment. Included in the soils section is a discussion regarding the disposal of up-land contaminated soils in Kreher Park as part of a CDF. Contaminated soils and any associated demolition debris are considered a solid waste. The management and disposal of that material will fall under the regulations of Wisconsin Administrative Code NR 500 including the landfill siting requirements.

Response

Removal of DNAPL contaminated soil was evaluated with alternative S-3A and S-4A. Additional text has been added to clarify this evaluation. Hot spot removal at Kreher Park was also evaluated as alternative S-3A. Containment using vertical barriers with hydraulic control at Kreher Park was evaluated as Alternative GW-2 and GW-5. On-site disposal at Kreher Park was evaluated as Alternatives S-4A and S-4B. The CDF is evaluated as Alternative SED-2. As agreed at the March 3, 2008 meeting, a new section has been added to the FS evaluating response actions on an "area of concern basis," describing integration of all response actions and processes.

We acknowledge that the construction of disposal cells and on-site disposal of material from the upper bluff area at Kreher Park would be completed in accordance with NR 500 siting requirements. Additional text has been added to clarify the evaluation of these alternatives.

6. **Groundwater** - As stated above, an inclusive wastewater treatment and disposal process needs to be added to the report that will include treatment of contaminated groundwater.

Response

At Kreher Park, Alternative GW-2 (containment using engineered surface and vertical barriers) would require groundwater extraction and treatment from the contained area to maintain groundwater elevations at or slightly below lake level. Estimates of the volume of groundwater recharge from precipitation at Kreher Park were made based on the water budget for existing conditions. An alternative using a vertical barrier and partial caps for the contained area was estimated, along with an alternative using a vertical barrier with a cap for the entire contained area. These volumes are also applicable to Alternative GW-5 (Containment and Permeable Reactive Barrier Wall). Groundwater extraction at Kreher Park (with no containment) was evaluated as Alternative GW-9. For the Copper Falls aquifer, Alternatives GW-3 (ozone sparge), GW-4 (surfactant injection and dual phase recovery), and GW-5 (in-situ chemical oxidation) were evaluated assuming continued operation of the existing NAPL recovery system. Alternative GW-9 (NAPL recovery using groundwater extraction wells) was evaluated to include additional extraction wells and an upgrade to the existing NAPL recovery system. Alternatives GW-7 (electrical resistance heating) and GW-8 (steam injection) are both thermal treatment alternatives that were evaluated for shallow soil and groundwater and for the Copper Falls. These alternatives would also require groundwater extraction and on-site treatment, but for only for a short duration.

7. As you know residents of the Chequamegon Bay area participated in a workshop hosted by EPA and WDNR on October 25, 2007. The purpose of the workshop was to solicit from participants the characteristics of cleanup options that would make a remedy(s) most acceptable to the public. The Agencies sponsored the workshop in response to requests by area residents for opportunities to provide early input on possible remedies. EPA anticipates that the input provided by workshop participants is an early indicator of the kind of feedback that might be received during formal comment period to be held in conjunction with the release of the proposed cleanup plan. Based on the results of the workshop, (see attached Summary) EPA and WDNR have prepared a brief analysis of the alternatives presented in the draft FS. Please include this analysis and prepare write-ups for alternatives presented in the future FS.

Alternative SED-1: No Action
SED-1 would not meet any of the characteristics of an action that would be acceptable to the community

Alternative SED-2: Consolidation, CDF, and Monitoring
Construction of a CDF (filing in 6 acres of lake bed) would fit the characteristic of less short term disruption to the area. It would limit the characteristics including; marina boat storage and use of the park area during construction, future use of the lake bed (covered), and lacks the permanence of a removal option.

Alternative SED-3: Removal, Capping, Treatment and/or Disposal, and Monitoring
Due to the vagueness of the discussion of this option in the FS it is difficult to determine where they plan on removal or capping. This option may be cheaper than options SED-2 and SED-4. Capping would limit the uses of the open water area. To protect the cap boating, swimming and wadding may be limited. Due to the potential of storms and ice damage, this option lacks permanence and might be subject to further action in the future.

Alternative SED-4: Removal, Treatment and/or Disposal, and Monitoring
Removal would meet the most characteristics. Short term it would cause about the same impacts as SED-2 and 3 and would take about the same amount of time. If designed and implemented correctly the marina operation should be able to operate during cleanup with the potential for some disruption to boat storage. Truck traffic can be limited through design. It would be the most sustainable as the wastes would be removed and could be separated for re-use during handling. This option also fits the City of Ashland Lakefront Development Plan and allows the most flexible future use of the city park, waterfront and lakebed areas.

Response

Based on agreements reached at the March 3, 2008 meeting, a reference has been made to the agencies' October 2007 outreach session. The summary document generated thereafter is provided as an appendix revised draft FS.

Specific Comments:

1. **Executive Summary, Page ES-2:** The RI Report was verbally approved by EPA with changes in October 2007 not August 2007.

Response

A sentence was added to clarify the verbal approval (October 9, 2007) and formal written approval (February 5, 2008) dates. Revisions to and approval of the HHRA report described in the written approval letter were also referenced via footnote.

2. **Executive Summary, Page ES-4:** The FS states "Although removal of all wood waste and fill soils from Kreher Park may be acceptable to the Agency…" EPA has not formally commented on whether removing the material that makes up Kreher Park is acceptable or not acceptable. Please remove that statement.

Response

This sentence has been modified as follows. "Although removal of all wood waste and fill soil from Kreher Park was evaluated as a potential remedial response, such an action would result in the loss of future use of the park (i.e. restoration as shallow lakebed or wetland)."

3. **Executive Summary, Page ES-4:** The FS states, "Both of these technical memoranda have been approved by USEPA". That is not the case. EPA reviewed and commented on the technical memoranda and you finalized them based on our comments but we do not approve those documents. Please clarify the statement to state that both of these documents were finalized after EPA review or something similar to that.

Response

Both documents (Alternative Screening Technical Memorandum or ASTM; Comparative Alternatives Analysis Technical Memorandum or CAATM) were submitted for Agency review; USEPA provided comments to the initial draft documents. Agency comments were incorporated into revised drafts of both documents, which were again submitted for Agency review. As described in an August 17, 2007 letter from USEPA, EPA invoked its right to modify the ASTM pursuant to Subparagraph 21(c) of the AOC. This USEPA modification was submitted as the final ASTM on September 7, 2007. For the CAATM, there has been no response from the Agency since that document was submitted as a revised draft report on October 7, 2007 in accordance with a USEPA deadline, Receipt of USEPA's comments triggered the deadline for submittal of the draft FS on October 29, 2007.

4. **Executive Summary, Page ES-6:** The discussion of SD-2 and SD-3 should include a more complete explanation of the difficulty in implementability (see sediment comment 13 below).

Response

See Response to General Comment 3.

5. **Figure 2-1:** Where is Lake Shore Drive on the site features figure? Where is the gravel-covered parking area? This figure should show and label the major features discussed in Section 1.1 of the report for those who are not familiar with the site. For example, it is not

clear where all of the NSPW property components are located. Also, label the buildings in red to the north of the "approximate location of the former coal tar dump" as the city WWTP – it is not clear on the figure.

Response

The text in Section 1.1 describes "gravel covered parking and storage yard", and each area is labeled "NSPW Storage Yard." These areas are referred to as "gravel covered storage yard" in the text to prevent future confusion. Lake Shore Drive is also Highway 2. The figure has been revised and labeled as "Lake Shore Drive/ U.S Highway 2." The former WWTP has also been labeled.

In addition, all of the major symbols and line types should be defined in the legend, including the monitoring wells (if known, who installed them and when?) and the red lines showing the structures (presumably, the red lines are for all structure types and not just for NSPW). Are the structures shown in red existing or include historic features? Using a different color of line type or line weight might be helpful in showing the NSPW structures vs. the non-NSPW structures. Other line types, shaded areas, and symbols are also not defined in the legend.

Response

Solid lines are used to show all existing buildings, and dashed lines are used to show historical features no longer present. Residential structures are labeled "Res.", and all NSPW buildings are labeled. This figure adequately shows the spatial relationship between existing and historical site features. Figure 1-3 has been added to show the location of former MGP features on the NSPW property. This figure shows the existing NAPL recovery treatment building and existing buildings currently used by NSPW.

Is the "approximate location of former solid waste disposal area" also part of the filled ravine? The line types used are very similar, as well as the "approximate location of former open sewer" and "NPL site boundary."

Response

Dashed lines of different colors have been used to show approximate locations of the filled ravine, former coal tar dump area, solid waste disposal area, and former open sewer. A label has been added to the dashed line showing the lateral extent of the filled ravine. The remaining historical features are adequately labeled.

Show the "former seep area" on the figures, as described in Section 3.1? Where is the NSPW service center, as mentioned at the end of Section 3.1.2?

Response

In Section 1.1, the U-shaped structure is referred to as the "NSPW facility." Based on the current use of this facility, it has also been referred to at the "NSPW service center". The text in Section 1.1 has been changed from "NSPW facility" to "NSPW service center".

6. **Section 3.1, Page 3-1, Summary of RI Findings:** Some additional lead-in description of the site geology would be helpful prior to mentioning the "Copper Falls Aquifer," or at least a reference to a later section where it is described.

Response

"Copper Falls aquifer" has been changed to "an underlying confined aquifer" in the second paragraph of Section 3.1. The first three paragraphs of Section 3.11 are a "lead-in" to a summary of the RI Report findings described in subsections 3.1.1 through 3.1.4. The Copper Falls aquifer is described in Section 3.1.2, which includes a summary description of the geology and hydrogeology at the site.

7. **Section 3.1.1, Page 3-3, Summary of RI Findings:** Delete last sentence "*This document presents the ……………… the Remedial investigation Report*."

Response

The above sentence has been deleted, and a paragraph of has been added to describe RI/FS tasks completed in accordance with the AOC.

8. **Section 3.1.2, page 3-3, Site Setting:** Include potentiometric maps and geologic cross-sections in this section. FS is supposed to be stand alone document.

Response

As agreed at the March 3, 2008 meeting, information on groundwater flow conditions and related cross-sections were included in the USEPA approved RI Report. RI/FS documents submitted to date follow the progression described in the AOC. The work plan, completed site characterization, and RI Report fulfill the requirements of AOC Tasks 1, 3, and 4, respectively. The ASTM, treatability studies, and CAATM and FS report fulfill the requirements of AOC Tasks 5, 6, and 7, respectively. Previous documents have been prepared and submitted in accordance with the sequence outlined in the AOC and approved work plan, and submitted documents adequately cross-reference previous RI/FS documents. The parties agreed at the March 3, 2008 meeting that cross-references will be acceptable and that the RI has not been appended to the revised FS.

9. **Section 3.1.3, Page 3-4, Nature and Extent of Contamination:** It is stated that, "*a low flow pumping system currently extracts NAPL from deep ………..*"

   Modify this sentence to state, "a low flow pumping system currently extracts NAPL consisting of 90 percent water and 10 percent product from deep ……….."

Response

This sentence has been modified to state that a low flow pumping system extracts "free product" rather than NAPL. Groundwater is used as a carrier to remove free product, which is present as NAPL. The relationship between groundwater recovered, and NAPL separated by the treatment system is explained later in the Copper Falls subsection of Section 3.1.3 (See Response to Comment No. 15).

10. **Section 3.1.3, Page 3-4, Nature and Extent of Contamination:** Add in here that NAPL is also present in the form of a sheen throughout the Kreher Park.

Response

The last sentence of the last paragraph of the Kreher Park subsection in Section 3.1.3 has been modified to clarify that LNAPL sheens were observed in the wood waste layer throughout Kreher Park.

11. **Section 3.1.3, Pages 3-4 – 3-7, Nature and Extent of Contamination:** Provide a figure showing the locations where NAPL has been measured or observed.

Response

The lateral extent of DNAPL identified during the RI in the filled ravine, Kreher Park, and underlying Copper Falls aquifer are shown on Figure 3-2.

12. **Section 3.1.3, Pages 3-4 and 3-5, Nature and Extent of Contamination:** It is stated that NAPL is located in isolated areas in the Kreher Park.

    This statement is incorrect because the NAPL sheen was detected in most of the test pits throughout Kreher Park. Modify the statement appropriately.

Response

As described in Section 4.1 of the RI Report, free-phase hydrocarbon is found within the four primary areas of concern (filled ravine, Kreher Park, offshore sediments, and the Copper Falls aquifer). Free-product includes both dense non-aqueous phase liquids (DNAPLs) and light non-aqueous phase liquids (LNAPL). At Kreher Park, DNAPL was encountered at isolated areas in the vicinity of the former seep and near monitoring well TW-11 located northwest of the WWTP adjacent to the shoreline. DNAPL in these areas was also found with an associated LNAPL (floating) fraction. However, LNAPL zones devoid of associated DNAPL are extensive at the Park area. LNAPLs in the form of sheens were observed in monitoring wells and test pits advanced at the Park, but DNAPL was absent. These separate LNAPL zones at Kreher Park, unlike those found associated with DNAPL, have yielded associated total VOC concentrations in groundwater more than an order of magnitude less (below 5,000 µg/l) than those areas where DNAPL (> 50,000 µg/l) is present. The FS text will be revised to describe the types of NAPL present in Kreher Park. This distinction is significant with respect to potential remedial alternatives evaluated in this report.

13. **Section 3.1.3, Pages 3-4 and 3-5, Nature and Extent of Contamination:** It is stated that *in both areas, NAPL remains in the underlying wood waste layer, which underlies the entire Park. Although the lateral extent of the NAPL zone is limited, contaminated soil and groundwater conditions are widespread across the entire Park area.*

    Since the NAPL is present in the wood waste layer throughout the Park, the lateral extent of NAPL cannot be considered a limited zone. Modify the statement appropriately.

Response

See Response to Comment 12.

14. **Section 3.1.3, Page 3-7, Nature and Extent of Contamination:** Is the NSPW service center the same as the NSPW garage shown on the figures?

Response

The garage building is part of the NSP service center, which includes the U-shaped building and shop area building, an office building, gravel covered storage yards, and asphalt paved driveways and parking lots (see Response to Comment 5).

15. **Section 3.1.3, Pages 3-7 and 3-10, Nature and Extent of Contamination:** It is unclear how much NAPL has been removed by the extraction system. According to page 3-7:

    Since 2000, NSPW has maintained a NAPL recovery system consisting of three extraction wells which have removed over 9,000 gallons of NAPL/water emulsification (approximately 10% oil/tar and 90% water) and over a million gallons of contaminated ground water from the aquifer.
    However, according to page 3-10:

    > *The NAPL removal system has removed a fraction (more than 8,300 gallons of product) of the NAPL and dissolved plume mass.*

    These amounts are not consistent. The first quote seems to indicate that 9,000 gallons of NAPL/water emulsification was removed, which was 10% oil/tar, so that approximately 900 gallons of NAPL would have been removed. However, the second quote states that 8,300 gallons of product was removed. Please clarify.

Response

NSPW installed a free-product recovery system to remove NAPL from the Copper Falls aquifer during 2000. That system consisted of three extraction wells. Well EW-4 was installed in 2002 to remove groundwater from the mouth of the filled ravine. This recovery system has been in continuous operation since installation; consequently the volume of groundwater treated on–site and the volume of NAPL recovered fluctuates because of variations in precipitation/infiltration. These conditions are presented in monthly reports (Task 8 of the AOC). The revised FS Report includes the most recent volume totals available. It also includes discussion of measurable changes in free-product recovery since the SITE demonstration was concluded in February 2007.

Through April 2008, approximately 1.98 million gallons of groundwater have been removed from the Copper Falls aquifer. Groundwater is used as a carrier to remove free product, and a significant volume of water is extracted. The free product is separated from the groundwater with an oil water separator, and held in a storage tank until arrangements for off-site disposal can be made. The groundwater is treated on-site prior to discharge to the sanitary sewer system. Through April 2008, approximately 9,700 gallons of free product have been separated from groundwater, which is approximately 0.4-percent of the total volume removed.

The volume of free product (NAPL) separated from the groundwater and the water content of the NAPL should not be confused. The former MGP likely generated tar-water emulsions (typically 10% oil/tar and 90%water). Because groundwater is used as a carrier to remove this material, a significant volume percentage (99.7-percent) of water is extracted, but the NAPL separated from the groundwater has a low water content. Analysis of "oil" samples collected from the storage tank yielded NAPL water contents of 0.17 and 4.34 percent of bulk weight; these laboratory reports are included in Appendix D-4 of the RI Report.

16. **<u>Section 3.1.3, page 3-11, Nature and Extent of Contamination</u>:** According to page 3-11: *Since operations at the WWTP were relocated in 1992, no significant contaminant contribution action has occurred.*

    Where were WWTP operations relocated from/to in 1992? Label the former/existing WWTP on the figures.

<u>Response</u>

The former WWTP has been labeled on the figures. As described in Section 3.1.4.1, "The City later moved operations for the WWTP to another location southeast of the City in 1992."

17. **<u>Section 3.1.3, Page 3-7, Nature and Extent of Contamination - Copper Falls Aquifer</u>:** It has not been demonstrated in the RI that hydrogeologic conditions at the site have restricted the migration of contaminants in the Copper Falls Aquifer. Also, references are made to a "stagnation zone" in the Copper Falls aquifer. Based on available information the existence of stagnation zone has not been established. Remove reference to a "stagnation zone."

<u>Response</u>

Based on the agreements reached at the March 3, 2008 meeting, the same language used in the USEPA approved RI has been used in the FS concerning this topic (see also the response to Comment 103).

18. **<u>Section 3.1.3, Page 3-7, Nature and Extent of Contamination - Copper Falls Aquifer</u>:** Last sentence should read; "Additional wells (plural) are needed to ensure that contaminants are not migrating beyond the shoreline in the Copper Falls Aquifer.

<u>Response</u>

This change has been made to the revised FS report.

19. **<u>Section 3.1.4.2, Page 3-10, Contaminant Source and Disposition</u>:** It is stated NAPL removal system has removed a fraction (more than 8,300 gallons of product). The volume of product removed is much smaller than specified herein. Modify this paragraph appropriately.

<u>Response</u>

As described in response to Comment 15, the revised FS Report has included the most recent volume totals available.

20. **<u>Section 3.1.4.3, Page 3-11 Summary</u>:** Last two sentences should read (additions are in bold); "Additionally, the high levels of PAHs in the soil at Kreher Park compared to the upper bluff **suggest the possibility** of a source at the Lakefront not exclusively caused by MGP wastes. These other potential sources include **spills during** rail car off loading of fuel feed stocks and raw materials to support industrial activity, primarily **MGP activity**."

<u>Response</u>

The text has been modified to include the "suggest the possibility" and "spills during" phases shown in bold text above.

There is no evidence to support inserting the phase "primarily MGP activity." Historical records document former MGP activities at the upper bluff area and former lumber operations at Kreher Park. Potential spills may have occurred while unloading fuel feed stocks and raw materials for both the MGP and the lumber operations. Consequently, text following "industrial activities" should include both former MGP and lumber operations.

Further, historical documents support wood preservation associated with the former lumber operations If the evidence of wood preservation at Kreher Park is ignored, weathering may explain higher PAH concentrations relative to VOC concentrations; however, it does not explain why PAHs concentrations are significantly higher at Kreher Park compared to the upper bluff area. Contaminant mass does not increase by weathering alone. Instead elevated PAH concentrations at Kreher Park suggest comingling with non-tar derived materials such as diesel and heavy range petroleum, which may have been added to tar waste for wood preservation.

21. **Section 3.3, Pages 3-14 and 3-15, Table 3-1:** The volume and areal extent of sediment contamination is based on a rounded value of 10 ppm dry weight, rather than the RAO of 9.5 ppm dry weight. The use of a rounded value may result in an underestimate of volumes, and underestimate of costs. The impacts of this rounding on volumes and costs should be discussed.

Response

The volume of contaminant mass increases as the clean-up standard declines, but the difference between 9.5 and 10 ppm is likely insignificant when estimating volumes for such a large area. In addition the data do not support any greater accuracy in estimating the volume for purposes of FS cost estimates. We will discuss the rounding performed to estimate sediment volume as an uncertainty. Contingency costs are included in the cost estimates to handle such variability.

22. **Section 3.3.1, Page 3-16, Soil:** In this section several areas that focus on the removal of soil based on highest contamination are described. However, the basis for selection and determination of extent of removal for these areas has not been provided. Provide a basis for selecting the areas for removal; determining extent of removal for each area; and demonstrate that this approach will be protective of human health and the environment. Provide a Figure depicting each area.

Response

The highest areas of contamination are associated with areas containing DNAPL. These areas were identified during the site investigations, and the RI Report contains a detailed description of completed investigations and investigation results. Figures 3-4 and 3-5 have been added to show the lateral extent of DNAPL at the upper bluff and Kreher Park, respectively.

Achievement of Remedial Action Objectives (RAOs) was used as the basis for selecting highly contaminated areas for removal. The RAO document was included in Appendix A of the RI Report. The RI Report and Appendix A will be cited as the source for this information.

23. **Section 3.3.1, Page 3-16, Soil:** It is stated herein that potential remedial alternatives focused on the removal of areas with the highest level of contamination. Provide a rationale for

focusing remedial alternatives for areas with the highest level of contamination; and demonstrate that such approach will mitigate risks identified at the site.

Response

See Response to Comment 22.

24. **Section 3.3.1, Page 3-16, Soil**: What was the rationale for selecting the NR 720 WAC benzene RCL to define the extent of soil contamination? A brief explanation would be useful.

Response

Benzene was used to provide a conservative estimate of the lateral extent of soil contamination because it has a low RCL and is one of the most wide-spread constituents of concern at the Site. The lateral extent of soil contamination includes unsaturated and saturated zone soils. This information will be added to the text.

25. **Section 3.3.2, Page 3-17, Groundwater:** What was the rationale for selecting the NR 140 WAC benzene Enforcement Standard exceedances to define the extent of groundwater contamination? See previous comment. Also, a note on the corresponding figure would be helpful, or in the legend.

Response

Benzene was also used to provide a conservative estimate of the lateral extent of groundwater contamination because it has a low ES and is one of the most wide-spread constituents of concern at the Site. This information will be added to the text.

26. **Section 3.3.3, Page 3-17, Sediment:** The preliminary remedial goal for sediment is a PAH concentration of 9.5 ppm dry weight. However, the sediment volume has been calculated using a PAH concentration of 10 ppm dry weight. This will result in underestimation of volume of sediment removal/treatment/disposal. This will also result in under estimation of costs.

Response

See Response to Comment 21

27. **Table 3-1, Volumes and Areal Extent of Contaminated Media:** It would be helpful to show the soil contamination sub-areas listed in this table on the corresponding figure for reference.

Response

The former coal tar dump area and filled ravine have been added to Figure 3-1. The lateral extent of excavation included with limited removal alternatives for the upper bluff area is shown on Figure 3-4, and the lateral extent of limited removal in Kreher Park is shown on Figure 3-5.

28. **Figure 3-1:** How is the extent of "soil contamination" defined on this figure? Is it where any contaminants are detected in soil, where NAPL is observed, where soil concentrations exceed

applicable criteria, or other? Was it based on the NR 720 WAC benzene RCL exceedances? Add an explanation to the legend or as a note.

Response

Additional text has been added to Section 3.3 to clarify these issues. The lateral extent of soil contamination includes soil from the saturated and unsaturated zone, and is based upon the NR 720 RCL for benzene; the lateral extent of groundwater contamination is based on the NR 140 ES exceedances for benzene. See Response to Comments 24 and 25 .Additional figures have been added to show the lateral extent of DNAPL at the upper bluff area (Figure 3-4) and at Kreher Park (Figure 3-5).

These new figures also show the areas evaluated for limited removal alternatives based primarily on the lateral extent of DNAPL. Additional text has been added to Section 6.3 to describe how limited removal areas were selected..

29. **Figure 3-2:** See previous comment, as applies to extent of "groundwater contamination." In addition, clarify that "Copper Falls" refers to the deep aquifer.

Response

See Response to Comment 28.

30. **Figure 3-3:** Again, how was extent of contamination defined on this figure? Presumably, it is based on exceedances of the PRG for sediment of 9.5 µg PAH /g, but it is difficult to tell on the figure. Or is it greater than 10 ppm? Also, see general figure comments.

Response

The figure is based upon 10 ppm. See Response to Comment 21.

31. **Section 4.2, Pages 4-1 and 4-2, SITE Program Demonstration:** A brief general description summary of the SITE ISCO demonstration is provided but the data and the report is not included in the FS. This technology has been retained for further evaluations in the FS; therefore, the full DCI/DTI Report should be included as an Appendix to the FS.

Response

This document has been provided as an appendix to the FS Report.

32. **Section 4.2, Pages 4-2 and 4-3, Cap Flux Testing:** The report provides a general description summary only of the cap flux testing that took place. No data from this test is provided in the report. Without the test data it is impossible to evaluate the results and conclusions reached that are reported here. Provide the report as an appendix to the FS.

Response

The report has been provided as an appendix to the FS Report.

33. **Section 4.2, Pages 4-2 and 4-3, Cap Flux Testing:** The summary provided in this section suggests that low levels of water soluble constituents were able to pass through the cap. The

summary does not include information if these concentrations are protective of human health and the environment.

Response

The summary has been amended to address this issue. See Response to Comment 32.

34. **Section 4.2, Pages 4-2 and 4-3, Cap Flux Testing:** The summary states that NAPL was not observed in the glass wool. Was NAPL observed in the cap? The information such as start date of the test is not provided. Based on the information presented in this section the bench scale suggested that there was no break through of NAPL from the cap, however, this information does not guarantee that NAPL will not break through the cap during the life of the cap or long term monitoring program.

Response

There was no NAPL observed in the cap. With only one minor exception, no VOCs or PAHs were transported to the cap in any column. This information is provided and discussed in the Cap Flux report submitted to EPA on September 18, 2007. The summary in the FS includes a more detailed discussion and the report has been appended to the revised FS.

35. **Section 4.3, Pages 4-4, Bench Scale Air Emissions Testing:** The report provides a brief summary of the bench scale air emissions testing that took place. No data from this test is provided in the report. Without the test data it is impossible to evaluate the results and conclusions reached in this summary that are reported here. Provide a copy of the report as an appendix to the FS.

Response

The report will be provided as an appendix to the FS Report

36. **Section 4.3, Pages 4-4, Bench Scale Air Emissions Testing:** Air dispersion modeling was conducted using the EPA AERMOD model. No information was provided about assumptions and values used for running the model under the various scenarios. No output from the model is provided for the scenarios. Provide all assumptions, input and output data for each of the scenarios reported in this section. This information could be included as an appendix to FS.

Response

The report will be provided as an appendix to the FS Report

37. **Section 4.3, Pages 4-4, Bench Scale Air Emissions Testing:** This section makes the assertion that several of the scenarios modeled indicated that heath risk levels (or standards) would be exceeded for receptors outside of the work area. The summary did not provide the resultant atmospheric concentrations of the COCs output by the model. Further, it did not report which health risk levels were being used for comparison. Provide the model output COC concentrations and the health risk levels that are referenced here in the text.

<u>Response</u>

This information was provided in the Bench Scale Emissions report which was provided to EPA on August 8, 2007. The report will be provided as an appendix to the FS Report.

38. **<u>Section 4.3, page 4-4, Bench Scale Air Emissions Testing</u>:** This section references Areas 1, 2, 2A, and 4 but the location of the area is not provided. Provide a figure showing locations of these areas.

<u>Response</u>

This information was provided in the Bench Scale Emissions report which was provided to EPA on August 8, 2007. The report will be provided as an appendix to the FS Report.

39. **<u>Section 4.4, Pages 4-5 and 4-6, Multiphase Flow and Consolidation Testing</u>:** This section provides a brief summary of the testing. Include the testing report as an appendix to the FS.

<u>Response</u>

The report will be provided as an appendix to the FS Report.

40. **<u>Section 6.1, page 6-1, Remedial Action Objections for Soil</u>:** The title of this sub-section should be "Remedial Action Objectives for Soil".

<u>Response</u>

This change has been made.

41. **<u>Section 6.1, page 6-1, Remedial Action Objections for Soil</u>:** For the 3rd bullet, define an "unacceptable risk" to ecological receptors.

<u>Response</u>

The definition of "unacceptable risk" is defined in the Remedial Action Objectives Technical Memorandum, which is the document referenced in this section. A summary of the risk is included in 3.2 of the FS Report.

42. **<u>Section 6.1, page 6-1, Remedial Action Objections for Soil</u>:** In the 4th bullet add sediments.

<u>Response</u>

The RAOs listed in this section of the FS Report were quoted from the RAO Technical Memorandum (Remedial Action Objectives Summary by Site Media table on Page 11). For consistency, we prefer not to make changes to language obtained from another document that has been approved by the USEPA.

43. **<u>Section 6.1, page 6-1, Remedial Action Objections for Soil</u>:** Revise the 5th bullet as "Protect the environment by minimizing/eliminating the migration of contaminants in the soil to groundwater". Add another bullet stating, "Protect the environment by eliminating migration of contaminants to surrounding sediments and surface water bodies".

Response

See Response to Comment 42.

44. **Section 6.2.2, Page 6-2, Table 6-2:** For engineering surface barrier NR 500 Clay Cap should be retained, because the existing soil cover cannot be considered as engineered barrier.

Response

NR 500 caps were retained for screening; the text for this process option has been changed to bold face text in Table 6-2.

45. **Section 6.3.2, Page 6-4, Alternative S-2 – Containment Using Engineered Surface Barriers:** Provide a figure(s) showing the existing surface barriers and proposed barriers.

Response

Figure 6-1 has been added to show the former ravine and MGP gas holders at the upper bluff, and the former coal tar dump area at Kreher Park (existing site features are also shown on Figures 1-2 and 1-3). Proposed engineered surface barriers for these areas are shown on Figure 6-2. Figures 7-1 also shows engineering surface barriers, which were also evaluated as potential groundwater remedial responses.

46. **Section 6.3.2, Page 6-4 and 6-5, Alternative S-2– Containment Using Engineered Surface Barriers:** Existing fill soils may prevent direct contact with the COCs, however, it has not been demonstrated that it meets the requirements of an engineered barrier, such as reduction of infiltration of precipitation or that it is of required uniform thickness across the site to qualify as an engineered barrier in terms of the direct contact pathway. To reduce infiltration an engineered barrier is necessary at the remainder of Kreher Park.

Response

The above comment implies that an impermeable surface barrier is needed for all areas of Kreher Park with saturated zone contamination. Surface barriers perform two functions 1) preventing direct contact with contamination and 2) restricting infiltration. We agree that existing fill prevents direct contact with COCs. Results of the test pit investigation identified several feet of fill soil overlying a wood waste layer in Kreher Park. Contamination was encountered above the wood waste layer in the former coal tar dump area, but it was not encountered above the wood waste layer anywhere else in the Park. Contaminated soil was encountered at the surface near the former seep area, but this risk was mitigated in 2002 when contaminated soil above the wood waste layer was excavated and clean fill was placed over the excavated area. Consequently, clean fill soil overlying subsurface soil and groundwater contamination is behaving as a barrier preventing direct contact with contaminated soil and groundwater. Additional text has been added to Section 6.3 for clarification.

Options evaluated in this Section 6.0 are limited to soil contamination, which includes unsaturated zone soil in the upper five feet (above the lake level) at Kreher Park. Capping the coal tar dump area would prevent infiltration and contaminant leaching where soil contamination is present in the unsaturated zone. No VOC or SVOC contaminants exceed RCLs in the overlying unsaturated zone fill soil unit outside the coal tar dump area. Therefore, there is no need to cap the remainder of Kreher Park to prevent contaminant leaching from the unsaturated zone. However, engineered surface

barriers can also be used to reduce infiltration, minimizing recharge to shallow groundwater at Kreher Park. Surface barriers that reduce infiltration were evaluated in combination with groundwater remedial alternatives described in Section 7.0.

We agree that it has not been demonstrated that existing fill soil meets the requirements of an engineered barrier. However, these fill soils consist predominantly of silty clay. Testing may yield results that indicate this fill has a low permeability, and is minimizing infiltration into the underlying wood waste layer. It is premature to conclude an engineered surface barrier is necessary at Kreher Park to reduce infiltration.

47. **Section 6.3.2, Page 6-4, Alternative S-2– Containment Using Engineered Surface Barriers:** The existing water treatment plant is in need of repair and cannot be qualified as an engineered barrier without significant repairs. Existing pavement and buildings will require upgrading by patching of holes and sealing of joints and cracks, foundation penetrations, and pavement penetrations to meet the requirements of an engineered barrier.

Response

The former WWTP is owned by the City of Ashland, and NSPW does not have control over the maintenance of these structures. The City's Waterfront Development Plan (March 2002) includes redevelopment of the WWTP buildings. For the FS, we have assumed that any redevelopment of the building will mitigate risks associated in with this facility identified in the Human Health Risk Assessment. As the facility currently exists, the former waste water treatment plant prevents direct contact with the subsurface contamination. The FS also address subsurface contamination beneath the WWTP. As stated in the fifth item in Section 6.3. "In the event that the building is removed, the area will be covered with a clay cap or asphalt pavement." This would meet the requirements of an engineered surface barrier.

48. **Section 6.3.3, Page 6-5, Alternative S-3A – Limited Removal and Off-site Disposal:** Describe how the extent of removal described in this section and Figure 6-1 was determined.

Response

Section 6.3 has been revised to address this issue. Figure 6-3A has been added to show the lateral extent of the limited removal excavation, and Figure 6-3B has been added to show the lateral extent of the unlimited removal excavation.

Section 3.3 has also been revised to address this issue; see Response to Comment 22.

49. **Section 6.3.3, Figure 6-1:** Show north direction for Figure 6-1.

Response

Figure 6-1 shows a directional compass in the upper left hand corner. Revised figures also show a directional compass in the upper left hand corner.

50. **Section 6.3.3, Page 6-5, Alternative S-3A – Limited Removal and Off-site Disposal:** It is stated that in the upper bluff area the removal will be required in two areas. The areas are south and north of St. Claire Street. In the Figure the extent of removal is only shown for the gas holder area. Modify the figure to show both removal areas.

Response

Figure 6-3A has been added to show both proposed excavation areas at the upper bluff area.

51. **Section 6.3.3, Page, 6-6, Alternative S-3A – Limited Removal and Off-site Disposal:** Clarify if the capacity referenced in Item Number 10 is for the existing landfill.

Response

The text has been revised (by combining items 9 and 10) to address this issue. A cost benefit analysis may be needed to evaluate disposal options for all material removed from the Site including material excavated from the filled ravine, Kreher Park, and off shore sediment. Disposal options include using existing commercial landfills, or constructing a landfill specifically for material removed from the Site.

52. **Section 6.3.3, Page, 6-6, Alternative S-3A – Limited Removal and Off-site Disposal:** *In Item Number 10 it is stated that a NR 500 landfill may by sited on property owned or purchased by NSPW.* The siting of a NR 500 landfill will be difficult, time consuming and may have significant resistance from the public and will have to go through a complex permitting process with the regulatory agencies.

Response

Thank you for the Comment. The public may also be resistant to leaving contaminated media in place at the site. If a significant volume of material is to be removed transportation costs increase significantly; consequently construction of a nearby landfill becomes cost effective. On or off-site landfills could also be implemented under the corrective action management unit (CAMU) rule (see response to Comment 59).,

53. **Section 6.3.3, Page, 6-8, Alternative S-3B – Unlimited Removal and Off-site Disposal:** *In Item Number 9 it is stated that a NR 500 landfill may by sited on property owned or purchased by NSPW.* The siting of NR 500 landfill will be difficult, time consuming and may have significant resistance from the public and will have to go through a complex permitting process with the regulatory agencies.

Response

See Response to comment 52.

54. **Section 6.3.3, Page, 6-7, Alternative S-3B – Unlimited Removal and Off-site Disposal:** *In Item Number 2 it is stated that wood waste layer will be removed, salvaged and used to backfill the excavated former ravine at the upper bluff area.* The wood chip layer is not expected to be free of contamination and therefore, would not be useful as a backfill material as suggested.

Response

No VOC or SVOC contaminants exceed RCLs in the overlying unsaturated zone fill soil unit outside the coal tar dump area. It was not suggested that the wood waste layer be used as backfill material. Instead, Item number 2 states "Clean fill soil overlying the wood waste layer will be removed, salvaged and used to backfill the excavated former ravine at the upper bluff area (emphasis added). Only the clean fill soil is intended to be salvaged and used as backfill elsewhere at the Site.

55. **<u>Section 6.3.3, Alternatives S-3A and S-3B</u>:** An additional key element of the conceptual design will be on the planned final end use of Kreher Park. Include the final end use of the park as a key element of the conceptual design.

<u>Response</u>

The FS Report assumes that the final end use of the Park will be consistent with the City's March 2002 Waterfront Development Plan, which includes continued recreational use for Kreher Park. Kreher Park is currently utilized as a recreation area, but it also contains the marina boat storage area, a City street adjacent to the shoreline, and the former waste water treatment building. The Waterfront Development Plan calls for an expansion of the marina and redevelopment of the former WWTP facility building.

If unlimited excavation is implemented, it would be possible to restore Kreher Park to pre-fill conditions (i.e. wetland area or shallow lakebed); it would also be possible to backfill the footprint of the Park following complete removal with clean fill to restore it to present elevations, or to backfill it with contaminated sediment, which would then require the construction of an on-shore confined disposal facility (CDF). A conceptual design (Figure 8-3) for redevelopment of Kreher Park with an off-shore CDF was also presented with the evaluation of alternative SED-2. This issue is addressed in the last paragraph of 6.3.3.

56. **<u>Section 6.3.3, Page 6-7, Alternative S-3B – Unlimited Removal and Off-site Disposal</u>:** Aside from the volumes, what are the estimated excavation depths in the upper bluff area and Kreher Park? What about the estimated depth and length required for the sheet pile? Showing the proposed sheet pile location on a figure would be useful.

<u>Response</u>

Estimated excavation depths and volumes are included in Section 3.3, which has been revised (see response to Comment 22). Additional information regarding the linear footage and depth of the sheet pile will has been added to Item 4. The east, west, and north sides of the excavation area where sheet pile would be installed are shown on revised Figure 6-3B, and have been labeled.

57. **<u>Section 6.3.4, Page 6-9, Alternative S-4 – Removal and On-site Disposal</u>:** A figure for this alternative showing the plan location of the on-site landfill as well as a section view would be helpful, as well as proposed excavations. Cap/liner details as well as the proposed dewatering system would also be useful.

<u>Response</u>

Figures 6-4A and 6-4B have been added to show the potential locations of on-site disposal cells at Kreher Park based on the limited and unlimited removal alternatives at the upper bluff area. Figure 8-1 shows the potential location of an on-site disposal cell for sediments removed from the adjacent inlet area. Cap and liner details and a proposed dewatering system are design details beyond the scope of the FS.

58. **<u>Section 6.3.4, Page 6-9, Alternative S-4 – Removal and On-site Disposal</u>:** How much residual soil and groundwater contamination exceeding RAOs will be left in place and what will be excavated? Where in Kreher Park will the on-site Disposal Cell be located and how will it be situated? Will it be constructed below grade, and if so, how will the on-site landfill

be adequately dewatered considering its location near the bay? Will there be a leachate collection and treatment system for the disposal cell? Will the disposal cell have a liner?

Response

It is unknown if any residual soil or groundwater contamination will be left in place. Natural attenuation and institutional controls for site closure are proposed as contingencies only if contaminants remain above RAOs.

With respect to construction of a disposal cell in Kreher Park, see Response to Comment 57.

59. **<u>Section 6.3.4, Page 6-9, Alternative S-4 – Removal and On-site Disposal</u>:** Alternative S-4 will require building of a landfill in Kreher Park. It is highly unlikely that this can be done in compliance with Wisconsin NR500. Explain how S-4 will meet ARARs in NR500.

Response

Landfill locational criteria and performance standards per NR 504.04 (1) state that "as part of the feasibility report required under ch. NR 512 an applicant shall demonstrate to the department that the proposed landfill will comply with all of the locational criteria and performance standards of this section unless an exemption is granted." NR 504.04(2) allows for an exemption to location criteria described in NR 504.04(3).

On-site disposal could also be implemented under the corrective action management unit (CAMU) rule, which is specifically intended for treatment, storage and disposal of hazardous remediation waste. Under the CAMU rule, EPA and authorized states may develop and impose site-specific design, operating, closure and post-closure requirements for CAMUs. CAMUs must be approved by EPA or an authorized state and designated in a permit or corrective action order. In addition, as appropriate, CAMUs may be approved by EPA as an applicable or relevant and appropriate requirement during a CERCLA cleanup using a record of decision or by an authorized state during a state cleanup using a CERCLA-like authority and a similar state document. Under CERCLA Section 121(e), no Federal, state or local permit is required for on-site CERCLA response actions. EPA has interpreted CERCLA Section 121 (e) to waive the requirement to obtain a permit and associated administrative and procedural requirements of permits, but not the substantive requirements that would be applied through permits[1].

60. **<u>Section 6.3, Thermal Treatment</u>:** In-situ thermal treatment using Electrical Resistance Heating (ERH) was retained for the soil technologies and also considered for Alternative GW-7. Why was an alternative for in-situ thermal treatment for soil using ERH not considered?

Response

Because groundwater is encountered at shallow depths, ERH was evaluated for both the unsaturated soil and shallow groundwater (saturated soil) as Alternative GW-7.

61. **<u>Section 6.3.5, Page 6-11 Alternative S-5A, -- Limited Removal and On-site Thermal Treatment</u>:** Define the "highest level of contamination" mentioned in this section.

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[1] *Management of Remediation Waste Under RCRA, EPA 530-F-98-026*, USEPA, October 1998.

Response

Sections 3.3 and 6.3 have been revised to address this issue. See Responses to Comments 22 and 48.

62. **<u>Section 6.3.5, Page 6-11, Alternative S-5A– Ex-Situ Thermal Treatment</u>:** Is the energy input necessary to dry the saturated soils during treatment considered?

Response

Yes.

63. **<u>Section 6.3.5, Page 6-11 Alternative S-5A, -- Limited Removal and On-site Thermal Treatment</u>:** Discharge to the sanitary will need permits and the discharge will have to meet the pretreatment requirements of the sanitary sewer system.

Response

NSPW understands that treated water can be discharged on site in accordance with the WPDES General Permit used in Wisconsin for groundwater remediation projects. If discharged to the sanitary sewer system, the effluent would need to meet requirements of the sanitary district to ensure that the treatment plant maintains compliance with its permit.

64. **<u>Section 6.3.5, Page 6-12 Alternative S-5B, -- Limited Removal and Off-site Thermal Treatment</u>:** Define the "highest level of contamination" mentioned in this section.

Response

Sections 3.3 and 6.3 have been revised to address this issue. Please see responses to Comments 22 and 48.

65. **<u>Section 6.3.5, Page 6-13 Alternative S-5B, -- Limited Removal and Off-site Thermal Treatment</u>:** Discharge to the sanitary will need permits and the discharge will have to meet the pretreatment requirements of the sanitary sewer system.

Response

Please see the response to Comment 63.

66. **<u>Section 6.3.6, Page 6-14 Alternative S-5B, -- Limited Removal and On-site Soil Washing</u>:** Define the "highest level of contamination" mentioned in this section.

Response

Section 3.3 and 6.3 has been revised to address this issue. See response to Comments 22 and 48.

67. **<u>Section 6.3.6, Page 6-15 Alternative S-6, -- Limited Removal and On-site Soil Washing</u>:** Discharge to the sanitary will need permits and the discharge will have to meet the pretreatment requirements of the sanitary sewer system.

Response

See Response to Comment 63.

68. **<u>Table 6-3</u>:** Other Remedial Technologies Used has not been described for each alternative in the narrative for each alternative. Provide a description how each remedial technology has been integrated into each alternative.

<u>Response</u>

Other remedial technologies included in this table include monitored natural attenuation, institutional controls, surface barriers, vertical barriers, and the CDF. As described in the response to Comment 58, natural attenuation and institutional controls for site closure are proposed as contingencies if contaminants remain above RAOs. Surface barriers are described as part of the site restoration for each alternative. Vertical barriers and the CDF are included because these soil remedial alternatives may be used in combination with remedial alternatives evaluated for groundwater and sediment. Section 9.0 has been added to describe potential integrated alternatives.

69. **<u>Section 6.4.1, Page 6-18</u>:** *It is stated that reduction in mass, toxicity, or mobility of contaminants, will result in the overall protection of human health and environment.* This is misleading since a soil alternative with limited removal will not be protective of human health and environment by itself. The high level of PAH contaminated areas and NAPL through out the Kreher Park will not have been addressed by these alternatives; and risks will still remain at the site. Each alternative on its own will not address all risks at the site because the remaining contaminants will continue to leach into the groundwater and possibly migrate into the bay. However, a combination of soil and groundwater alternatives for Kreher Park and Upper Bluff could be protective of human health and environment.

<u>Response</u>

See Response to General Comment 2. The FS Report and preceding technical memoranda evaluated potential remedial responses by media (soil, groundwater, and sediment). This statement refers explicitly to soil and potential soil remedial alternatives evaluated in this section. Additional text has been added at the beginning of Section 6.3 to describe the limitation of soil remedial alternatives evaluated in this section.

The situation cited above (high levels of PAH contamination and NAPL throughout Kreher Park) is misleading. LNAPL contamination associated with the wood waste layer is present in the saturated zone; potential remedial alternatives for saturated zone contamination are evaluated in the groundwater section. We agree that a combination of soil and groundwater alternatives will be needed; alternatives are cross-referenced (see response to Comment No. 68 above). A new section has been added to the FS Report describing how the selected response actions will be integrated; potential integrated alternatives are described in Section 9.0.

70. **<u>Section 6.4.1, Page 6-18</u>:** *It is stated that the remaining potential remedial alternatives for soil will achieve compliance with ARARs.* For Alternative S-4 construction of disposal cell on Kreher Park may not meet the requirement of siting the landfill.

<u>Response</u>

See Response to Comment 59.

71. **<u>Section 6.4.1, Page 6-18</u>:** *It is stated that the remaining potential remedial alternatives for soil will achieve compliance with ARARs.* Since the high level of PAH contaminated areas and presence of NAPL through out the Kreher Park will not have been addressed by all remaining alternatives, therefore, the remaining contamination in the Kreher Park will continue to leach into the groundwater and possibly migrate into the bay. However, a combination of soil and groundwater alternatives for Kreher Park and Upper Bluff may meet the ARARs.

<u>Response</u>

See Response to Comment 69.

72. **<u>Table 6-4, Alternative S-2</u>:** *It is stated that surface barriers will also reduce infiltration and minimize leaching to groundwater.* In Kreher Park the fill material that is proposed to be an engineered barrier was never designed and constructed as an engineered barrier. Existing fill soils may prevent direct contact with the COCs, however, it has not been demonstrated that it meets the requirements of an engineered barrier, such as reduction of infiltration of precipitation or that it is of required uniform thickness across the site to qualify as an engineered barrier in terms of the direct contact pathway. The fill is not of low permeability soil and was not compacted to achieve low permeability. Therefore, the existing fill cover cannot be considered to be an engineered barrier for the Kreher Park to reduce infiltration. This alternative on its own will not address risks at the site because the contaminants will continue to leach into the groundwater and possibly migrate into the bay.

<u>Response</u>

See Response to Comment 46.

73. **<u>Table 6-4, Alternative S-3A</u>:** Since the high level PAH contaminated areas and the presence of NAPL through out Kreher Park are not addressed in this alternative the risk at the site will remain. Also, the comment for an engineered barrier and infiltration mentioned above for Alternative S-2 apply to this comment (see Comment 72). This alternative on its own will not address all risks at the site because the remaining contaminants will continue to leach into the groundwater and possibly migrate into the bay. This comment also applies to Alternatives S-4. S-5A, S-5B and S-6.

<u>Response</u>

See Responses to Comments 69 and 71.

74. **<u>Table 6-5, Alternative S-2</u>:** *It is stated that the surface barrier will reduce infiltration and minimize mobility of contaminants leaching to groundwater.* Existing fill soil at Kreher Park has not been demonstrated to meet the requirements of an engineered barrier. The fill soil at the Kreher Park does not comprise low permeability soil; the quality of the fill was not checked prior to placement; the fill was not place with required uniform thickness across the site; the fill was not compacted in lifts during its placement, there was no QA/QC performed during placement of the fill; and the intent of filling the Kreher Park was not to provide an engineered barrier but to reclaim land. Therefore, the fill placed at Kreher Park cannot be

considered to be engineered barrier that help to reduce infiltration or reduce mobility of contaminants leaching to groundwater.

<u>Response</u>

See Responses to Comments 46 and 72.

75. **<u>Table 6-5, Alternative S-3A</u>:** *It is stated that the reduction of toxicity, mobility and volume reduction is expected to be high.* Since high levels PAH contaminated areas and the presence of NAPL through out the Kreher Park has not been addressed in this alternative the reduction in toxicity, mobility and volume reduction is expected to be low. This alternative on its own will not achieve reduction in toxicity, mobility and volume reduction. This comment also applies to Alternatives S-4. S-5A, S-5B and S-6.

<u>Response</u>

See Response to Comment 69.

76. **<u>Table 6-5, All Alternatives (except S-1 and S-3B)</u>:** For these alternatives besides residual contamination mentioned, high level PAH contaminated areas and presence of NAPL throughout the Kreher Park will not be addressed. This should be mentioned in the type and quantity of residuals remaining.

<u>Response</u>

See Response to Comment 69.

77. **<u>Table 6-6, Alternative S-2</u>***:* Same as Comment 74 above.

<u>Response</u>

See Response to Comment 46.

78. **<u>Table 6-6, Alternative S-3A</u>:** *It is stated that significant contaminant mass will be removed from highly contaminated areas where NAPL is present. Residual contamination may remain at the site.* Since high level of PAH contaminated areas and the presence of NAPL through out the Kreher Park has not been addressed in this alternative it is inappropriate to state that residual contamination will remain on site. This comment also applies to Alternatives S-4. S-5A, S-5B and S-6.

<u>Response</u>

See Response to Comment 69.

79. **<u>Table 6-6, Alternative S-3A</u>:** *It is stated that post remediation monitoring for residual contamination remaining on site may be needed to ensure compliance with RAOs.* Same as Comment 78 above.

Response

See Response to Comment 69.

80. **Table 6-6, All Alternative (except S-1):** *For protection of community and site worker during remediation it is stated that actions to protect community and site workers during remediation can be implemented.* Provide a general description such as actions to protect community and site worker. The chemical risks the community and worker face, how long the risk will exist for the community or worker, the impact of vehicular traffic risks, and other factors are not discussed. Also, what are the ways to mitigate such risks are not discussed. Provide alternative specific information.

Response

Actions that will protect the community will include perimeter security that will prevents direct contact with contaminated media encountered at work areas, and perimeter monitoring for airborne contaminants potentially migrating from work areas. Site workers can be protected by use of personnel protection equipment at work areas, and monitoring workers for potential exposure to airborne contaminants. Exposure will be limited by using earth moving equipment to handle contaminated material, and creating exclusion zones around work areas. A site specific health and safety plan will be prepared prior to implementing the remedial responses to address these issues in detail.

Constituents of concern at the site are well documented in the RI Report, and potential exposure pathways were evaluated in the Human Health Risk Assessment. Any potential risks during remediation would be short term; the duration will depend on the requirements to complete remedial action. Vehicle travel and mitigation of risk will need to be addressed during the design phase.

81. **Table 6-6:** Limited Removal and Off-site Incineration is Alternative S-5B and not S-5A.

Response

The table has been corrected.

82. **Table 6-7, Alternative S-2:** *It is stated for the surface barrier that it is a reliable technology for elimination of direct contact exposure route and reduction of infiltration.* An engineering barrier is a reliable technology to reduce infiltration if the barrier is designed to use appropriate low permeable material, it is compacted in lifts (except for plastic liners and fabrics), it is designed such that it promotes appropriate surface water drainage, appropriate QA/QC is followed during construction etc. None of this was done for either the asphalt in the upper bluff or the fill in the Kreher Park.

Response

With respect to soil contamination, this statement regarding the reliability of surface barriers is accurate. Existing asphalt pavement on the NSPW property prevents direct contact and reduces infiltration. Presumably, new asphalt at the upper bluff and a clay cap over the former coal tar dump area would further reduce infiltration.

The QA/QC construction requirements cited above assume that surface barriers must be impermeable. The standard for which surface barriers were evaluated in this section is "reduction of infiltration" to prevent contaminant leaching from contaminated soil in the unsaturated zone. Surface barriers could also be used to restrict groundwater recharge. Consequently, surface barriers were also evaluated as potential remedial alternatives for groundwater in Section 7.0.

Additionally, as described in response to Comments 46 and 74, capping the coal tar dump area will reduce infiltration where soil contamination is present in the unsaturated zone. The appropriate QA/QC during construction would be used for this cap. It is unnecessary to cap the remainder of Kreher Park because no VOC or SVOC contaminants exceed RAOs in the overlying unsaturated zone fill soil outside the coal tar dump. Regardless, fill soils over the remainder of the Park consist predominantly of silty clay. Testing may yield results that indicate this fill soil has a low permeability, and is effectively reducing infiltration. Therefore, it is premature to conclude an engineered surface barrier is necessary at all areas of Kreher Park to reduce infiltration.

83. **Table 6-7, Alternatives S-3A and S-3B:** *For Administrative Feasibility it is stated that Regulatory approval likely, selection of landfill for off-site disposal would be required.* Getting regulatory approval of an off-site landfill is probably difficult. If the landfill is located near the Great Lakes it would likely be even more difficult to obtain regulatory approval.

Response

See Response to Comment 52.

84. **Table 6-7, Alternatives S-4:** *For Administrative Feasibility it is stated that Regulatory approval likely, would require siting and construction of disposal cell for on-site disposal.* Getting regulatory approval of a disposal cell is probably difficult. Since the disposal cell is located near the Great Lakes it probably would make it difficult to obtain regulatory approval.

Response

See Response to Comment 52.

85. **Table 6-8, Alternative S-3B:** Mobilization costs for alternative S3-B appears to be high. Provide a breakdown and justification of the high mobilization cost estimate.

Response

See costs summarized in revised Appendix F1.

86. **Table 6-8, Alternative S-3B:** The cost estimate does not appear to include restoration of Kreher Park to its original condition. The public would expect that the Park be returned to its original use as a park. Include an estimate for restoration of the park to original condition in addition to the estimate given for wetlands restoration.

Response

See costs summarized in revised Appendix F1.

87. **Table 6-9:** Modify this table based on Comments 83 - 86.

Response

Modifications to Table 6-9 have been made in accordance with Responses to Comments 83 through 86.

88. **Table 6-9, Comparison of Potential Soil Remedial Alternatives:** Given that "the evaluation of short-term effectiveness is based on the degree of protectiveness of human health achieved during construction and implementation of the remedy," the short-term effectiveness for alternatives including excavation would probably be somewhat lower than for those alternatives where no excavation occurs, due to the potential exposure of the community and construction workers to contaminants during excavation.

Response

Agreed.

89. **Section 6.5.1, Page 6-37 through 6-40:** The header provided for pages is incorrect. It should read "Remedial Alternatives for Groundwater".

Response

The correction to the header has been made.

90. **Section 6.5.1, Page 6-37:** It can be inferred from the discussion that the unlimited removal alternative and limited removal alternatives will provide the same level of overall protection of human health and environment. This is not correct because significant contamination will still remain for the limited removal alternative.

Response

This comment is misleading. For limited removal, groundwater contamination, not soil contamination, will remain. No soil or groundwater contamination will remain for the unlimited removal option. With respect to soil contamination, the same level of protection will be provided for the limited and unlimited alternatives.

91. **Section 6.5.2, Page 6-37:** *It is stated that if properly implemented, the remaining remedial responses could achieve compliance with ARARs and TBCs for soil*. The other alternatives inferred in here are all limited removal alternatives. For limited removal alternatives, areas of high PAH contamination and NAPL throughout Kreher Park will still remain. Explain how these areas will meet ARARs.

Response

This section is specific to ARARs and TBCs for soil. Limited removal is not intended to remediate contamination below lake level. Potential remedial alternatives for this contamination and compliance with groundwater ARARs are evaluated in Section 7.0.

92. **Section 6.5.3, Pages 6-37 and 6-38:** It can be inferred from this section that long term effectiveness and permanence for limited removal alternative does not appear to address high PAH areas and NAPL that will remain in the Kreher Park.

Response

This section is specific to soil. Limited removal is not intended to remediate contamination below lake level. Potential remedial alternatives for this contamination and compliance with groundwater ARARs are evaluated in Section 7.0.

93. **Section 6.5.6, Page 6-39:** All limited removal alternatives except Alternative S-3B are considered to be easily implementable. This is not correct because there probably would be significant administrative feasibility issues with on-site landfill and off-site landfill alternatives.

Response

See Response to General Comment 3.

94. **Figure 6-1:** See general figure comments. A more detailed legend and symbols are needed, or else divide the figure into two figures – excavation/demolition plan and containment/restoration plan.

    For example, the text description of Alternative S-3A in Section 6.3.3 indicates that there are two removals (excavation areas). However, only one area in red is shown on the figure. Blue areas seem to indicate asphalt pavement (existing or proposed?), but not indicate excavation in these areas. Further, it is not clear on the figure that any excavation is to take place in the "low permeability cap" area (green hatching).

Response

Figures for Section 6.0 have been revised to show existing conditions (Figure 6-1), the location of engineered surface barriers (Figure 6-2), limited and unlimited excavation areas (Figures 3A and 3B), and on-site disposal cell (Figures 6-4A and 6-4B). The locations of surface barriers (asphalt pavement and low permeability cap) are all proposed. Alternative S-2 assumes no excavation prior to installation of surface barriers. Alternatives S-3B, and S-4 assume placement of surface barriers in the upper bluff area after excavation, and alternative S-3A, S-5A, S-5B, and S-6 assumes surface barriers in the upland area and in Kreher Park after excavation.

95. **Figure 6-1:** Is the NAPL to the south of the former tanks/holders bounded? The dashed line used for the NAPL border gives the impression that the boundary is inferred. If so, some pre-design investigation may be warranted to see if the NAPL extents further to the south.

Response

The extent of NAPL in the ravine fill is well defined; the dashed line indicating an inferred boundary has been revised as solid to the south of the former holders. A dashed line remains around the clay pipe area where DNAPL was observed during the 2001 clay tile investigation.

96. **Figure 6-2:** The symbol color for "Kreher Park Extent of Fill" and "Filled Ravine Extent of Fill" are nearly identical – they are difficult to tell apart. Combine the symbols into one or use more contrasting colors.

Response

Different colors have been used to distinguish between fill at the upper bluff and at Kreher Park on revised Figure 6-1.

97. **Figure 6-2:** The legend indicates that the shaded areas are the extent of fill, yet the figure title indicates that this shows unlimited removal. Presumably, they are the same areas. If so, why does the area not match closer to the extent of soil contamination shown on Figure 3-1? A figure showing the sample locations that exceed the RAOs would be helpful, if this is different than Figure 3-1. Alternatively, more explanation in the notes/legend of Figure 6-2 would be beneficial.

Response

See Response to Comment 94.

98. **Table 6-6, Evaluation of Short Term Effectiveness for Potential Soil Remedial Alternatives:** What types of actions to protect the community and site workers during remediation would be necessary and implemented for each alternative?

Response

See Response to Comment 80.

99. **Table 6-7, Evaluation of Implementability for Potential Soil Remedial Alternatives:** "Availability of Services and Materials" description for Alternative S-4 does not seem to apply to this alternative since it mentions thermal treatment.

Response

Additional text for S-4 has been added to this table to address this issue.

100. **Section 7.3, Page 7-4, Alternative GW-2 – Containment Using Engineered Surface and Vertical Barrier:** Low Permeability Soil Cap is also compatible with the areas of Kreher Park that are not excavated.

Response

Alternative GW-2 has been revised to include a surface barrier placed over the entire 11.6 acre parcel, and using partial engineered surface barriers for the marina parking lot and former coal tar dump area. However, a low permeability cap across all of Kreher Park will require the removal of the marina parking lot, Marina Drive, and the former WWTP in these areas.

A surface barrier over the former coal tar dump area will reduce contaminant leaching from the unsaturated zone if contaminated soil remains in place. Asphalt pavement over the gravel covered marina parking lot will reduce infiltration at this area. If the WWTP is removed, a clay cap or asphalt pavement could be installed as a surface barrier in this area. Groundwater recharge to the contained area could also be reduced by capping the entire Park. Comparatively, capping only select areas at the Park will lower implementation costs, but will increase operation and maintenance costs required to maintain groundwater elevations at or below lake level within the contained area. Regardless, a clay cap across all of Kreher Park may not be needed because there is likely little infiltration through the

existing silty clay fill cover. Testing will be required to evaluate the infiltration capacity of these fill soils. Storm water management (i.e. drainage swales and storm water retention basins) will also be constructed as part of any cap remedy to reduce groundwater recharge from infiltration if the park is not completely covered with a final cap. Estimated groundwater recharge under existing conditions, with a partial cap, and for a cap over the entire Park has been included in this section to evaluate surface barrier options.

101. **Section 7.3, Alternative GW-2 – Containment Using Engineered Surface and Vertical Barrier:** This alternative does not address contamination in Copper Falls Aquifer. Show how groundwater contamination in the Copper Falls Aquifer will be addressed.

Response

Engineered surface and vertical barriers described in this alternative are intended to address groundwater contamination at Kreher Park and the filled ravine; the use of these barriers is limited to shallow groundwater contamination. Shallow groundwater in the filled ravine and at Kreher Park overlies the Miller Creek Formation. The Miller Creek Formation is the confining unit for the underlying Copper Falls aquifer. Vertical barrier walls would not be feasible for the underlying Copper Falls aquifer because this deep aquifer is confined by the Miller Creek. Installation of a barrier wall for contaminants in the Copper Falls aquifer will require penetration of the Miller Creek, formation which will compromise the long-term integrity of this confining unit. Remediation of groundwater contamination in the Copper Falls aquifer is evaluated in Alternatives GW-3, GW-4, GW-5, GW-6, GW-7, GW-8, and GW-9.

102. **Section 7.3, Pages 7-4 and 7-6, Alternative GW-2 – Containment Using Engineered Surface and Vertical Barriers:** It is unclear how this alternative would accomplish containment. As described in the text and shown on Figure 7-1, the surface barriers would reduce some infiltration, but other areas within the extent of soil contamination are left open (i.e. there is no engineered barrier, note: as discussed in several comments above the fill present in Kreher Park does not meet the definition of an engineered barrier for infiltration). Surface water could flow across the surface barriers and then infiltrate into the soil in the uncapped areas.

Response

The comment assumes that surface barriers must be impermeable to be effective. As defined in the FS report, "Surface barriers eliminate the direct contact exposure pathway and reduce contaminant leaching from the unsaturated zone, by restricting infiltrating water from contacting contaminated soil." The former coal tar dump area is the only area where VOC and SVOCs exceeded RAOs in the unsaturated zone; installation of a clay cap over this area will eliminate the direct contact pathway and prevent contaminant leaching. At the remainder of Kreher Park, several feet of clean fill soil overlies the wood waste layer (which lies below lake level) where LNAPL contamination was observed.

When vertical barriers are used to contain shallow groundwater, surface barriers can also be used to reduce groundwater recharge in the contained area. The conceptual design includes a storm water basin (Item 8) as part of this alternative to manage surface water. The conceptual design also includes pressure relief wells and the periodic removal of groundwater (Item 9) from the contained area to maintain the water table at or below lake level to prevent groundwater discharge. Regardless, Alternative GW-2 was evaluated with a cap for the entire Park and for caps for select areas. As

described in response to Comment 100, capping select areas at the Park will lower implementation costs, but increase operation and maintenance costs required to maintain groundwater elevations.

103. **Section 7.3, Page 7-4, Alternative GW-2 – Containment Using Engineered Surface and Vertical Barriers:** *It is stated that the regional flow conditions in the Copper Falls aquifer indicated that a stagnation zone beneath the center of Kreher Park has prevented the dissolved phase plume from migrating beyond the shoreline*. The groundwater in the copper falls aquifer should be discharging some where, most likely into the lake. There is no evidence that the upward gradient is discharging into the shallow groundwater zone in Kreher Park. The dissolved chemicals will migrate with the groundwater; therefore, the likelihood of a stagnation zone restricting contamination migration is questionable. Provide an explanation in this section where the groundwater from Kreher Park is discharging and explain how the vertically upward flow in Kreher Park is causing a stagnation zone that is restricting contamination migration in the Copper Falls Aquifer. Additional wells will likely be needed to ensure that the contaminants are not migrating beyond the shoreline in the deeper portion of the Copper Falls Aquifer.

Response

The RI report describes regional groundwater discharge to the lake from the Copper Falls aquifer. At the Site, this regional groundwater discharge is from deep within the aquifer below the location of the free-product and dissolved phase plumes. Piezometers screened in the upper Copper Falls show that the direction of groundwater flow is north toward the lake. However, piezometers installed along the shoreline also show that localized groundwater flow is influenced by the increasing thickness of the Miller Creek from the area of the MW-2(NET) well nest. The hydraulic head decreases between the upper bluff area and the center of Kreher Park (MW-2(NET) well nest), then increases toward the shoreline as the Miller Creek Formation increases in thickness. This indicates that groundwater in the upper Copper Falls is not discharging at this area. Instead, a stagnation zone is located at this low pressure "trough" aligned down the center of Kreher Park: it forms as the result of the inflection in gradients between the upper bluff and the shoreline, and conforms to pattern of the elevations of the top of the Copper Falls aquifer and shown graphically on cross-sections on Figures 3-2 through 3-4 in the RI report.

At the upper bluff area, the free product plume is found along the interface of the Miller Creek and Copper Falls aquifer, and the migration of this plume is restricted by the strong upward gradients in the Copper Falls aquifer. The farthest distance down gradient the dissolved phase portion of this plume has been measured is at well MW-21B, approximately 400 feet from the former MGP facility. Similar to the free-product plume, the dissolved phase plume is subject to the same upward gradients. The farthest distance down gradient the dissolved phase plume has been measured is at MW-2A/B(NET), about 600 feet from the release area. The dissolved phase plume that has migrated beneath Kreher Park is located at the top of the Copper Falls aquifer. Groundwater samples collected from wells installed below the Miller Creek / Copper Falls interface along the shoreline at Kreher Park indicate that the contaminant plume has not migrated beyond the shoreline. Additional wells installed along the shoreline should further verify this contaminant transport condition.

We agree "There is no evidence that the upward gradient is discharging into the shallow groundwater zone in Kreher Park" as stated in the above comment. The Miller Creek, which is the confining unit

for the underlying Copper Falls aquifer separates shallow groundwater from the confined aquifer (see also the response to Comment 17).

104. **Section 7.3, Page 7-4, Alternative GW-2 – Containment Using Engineered Surface and Vertical Barriers:** Provide the estimated number of barrier wells needed for Kreher Park. Provide the estimated extraction rate for barrier wells.

Response

Barrier wells for shallow groundwater for the filled ravine and at Kreher Park are evaluated as Alternative GW-9 (Groundwater Extraction). Barrier wells were screened, but not retained for the underlying Copper Falls aquifer.

105. **Section 7.3, Page 7-4, Alternative GW-2 – Containment Using Engineered Surface and Vertical Barriers:** *For barrier well it is stated that regional groundwater flow conditions in the Copper Falls aquifer has prevented the dissolved phase plume from migrating beyond the shoreline.* Revise this statement in accordance with the stagnation zone comments in #103.

Response

See Response to Comment 103.

106. **Section 7.3, Page 7-4, Alternative GW-2, Barrier Wells:** The last sentence of the first paragraph is unclear as to how additional data will ensure that contaminants will not migrate beyond the Park shoreline.

Response

Existing piezometers along the shoreline are screened below the Miller Creek Copper Falls aquifer interface. Additional wells will be installed deeper than existing wells at the shoreline. Hydrogeologic data from deeper wells will provide additional information on groundwater flow conditions in the Copper Falls aquifer, and should verify the presence of the stagnation zone. Groundwater quality data will also verify that the plume has not migrated beyond the shoreline at lower elevations in the Copper Falls.

107. **Section 7.3, Page 7-6, Alternative GW-2 – Containment Using Engineered Surface and Vertical Barriers:** Is the sheet piling depth terminating in the Miller Creek formation? Provide a cross section for each side of the sheet piling to demonstrate that the suggested depth of sheet piling is appropriately determined. Also provide the depth of sheet pile termination in the Miller Creek formation.

Response

The sheet pile will be advanced to an approximate depth of 25 feet below existing ground surface along the shore line. This depth will permit the removal of 10 feet of sediment from the adjacent inlet area. The sheet pile will be installed to an approximate depth of 16 feet on the east, west, and south sides of the containment area. This will allow the sheet pile to be embedded several feet into the Miller Creek Formation, the surface of which is encountered approximately 12 feet below grade through the Park.

108. **Section 7.3, Page 7-6, Vertical Barriers, Bullet #8:** Placing a storm water detention pond within the containment facility is likely to increase rather than decrease infiltration into the containment, it will provide an area where water will build up creating a hydrostatic head driving water down into the containment soil, rather than designing for the water to sheet flow off of the containment area unless the basin is has an impermeable liner. What is the rationale for stating that a storm-water basin will restrict infiltration?

Response

A storm water basin would be designed to retain water, and thus would be lined to prevent seepage. Water from the storm water basin would be discharged to Chequamegon Bay via a drainage ditch or outfall pipe shown on Figure 7-1.

109. **Section 7.3, Page 7-6, Alternative GW-2 – Containment Using Engineered Surface and Vertical Barriers:** *It is stated that 15 pressure relief wells will be installed to periodically remove groundwater and reduce the hydraulic head within the confined area.* It is unclear how the "pressure relief wells" will operate – explain how these wells will be operated? How will the extracted groundwater be managed? If they are operated periodically how will the hydraulic head be maintained below lake level?

Response

The conceptual design includes pressure relief wells and the periodic removal of groundwater (Item 9) from the contained area. The contained area does not need to be completely de-watered. The water level in the contained area would need to be maintained at or slightly below lake level to prevent discharge to the bay via groundwater. Extracted groundwater will be treated on-site before discharge to the sanitary sewer system, or transported via truck to the sanitary sewer system. Operation of the pressure relief wells could include regular (i.e., daily) or continuous pumping.

110. **Section 7.3, Page 7-7, Alternative GW-3 – In-situ Treatment Using Ozone Sparging:** This alternative is confusing related to whether or not ozone sparging will be implemented for shallow groundwater in the ravine and at Kreher park. The text states:

Air/ozone sparge was retained for further evaluation as a potential in-situ treatment alternative for contaminated groundwater encountered in the underlying Copper Falls aquifer.

The text continues to list obstacles to implementing ozone sparging in Kreher Park, and then states:

The layout of an ozone sparge system for underlying the Copper Falls Aquifer is shown on Figure 7-2.

However, the text lists conceptual design key elements of an ozone sparging shallow groundwater at the upper bluff area and at Kreher Park, and for the Copper Falls Aquifer. Further, Figure 7-2 shows implementation of ozone sparging for the Copper Falls aquifer and for Kreher Park.

Response

These implementability issues are discussed in the paragraph following the conceptual design description. Figure 7-2A has been added to show the conceptual design of ozone sparge systems for shallow groundwater at the upper bluff and at Kreher Park, and Figure 7-2B has been added to show the ozone sparge system for the Copper Falls.

111. **Section 7.3, Page 7-7, Alternative GW-3 – In-situ Treatment Using Ozone Sparging:** How will the recovered groundwater and NAPL be managed?

Response

As stated in Item 7, "…the existing groundwater extraction system will likely be operated concurrent with the ozone sparge system to recover NAPL." Groundwater treatment and NAPL recovery are described in Alternative GW-9.

112. **Section 7.3, Page 7-8, Alternative GW-4, In-situ Treatment using Surfactant Injection and Dual Phase recovery, bullet #4:** Clarify the timeframe over which the five injection of surfactant will be administered to achieve removal of the NAPL.

Response

The conceptual design text has been revised to clarify the time frame; five injections one month apart, and monthly removal of fluids for six months following the fifth application.

113. **Section 7.3, Page 7-9, Alternative GW-5 – In-situ Treatment using Permeable Reactive Barrier Walls:** Provide cross section for each side of the sheet piling to demonstrate that the suggested depth of sheet piling is appropriately determined. Also provide the depth of sheet pile termination in the Miller Creek formation.

Response

See Response to Comment 107.

114. **Section 7.3, page 7-10, Alternative GW-5 – In-situ Treatment Using Permeable Reactive Barrier Walls:** *It is stated fluid levels will also be monitored to ensure the hydraulic head within the confined area remains below lake level.* How will this be accomplished without a complete cap, with a porous PRB included as part of the vertical barrier around the confined area, and without pressure relief wells?

Response

The PRB will be designed to allow groundwater discharge. The conceptual design includes installation of a porous PRB wall on the west side of the Park; the remainder of the park would be enclosed with a vertical barrier. The PRB will permit a hydraulic connection between groundwater in the contained area and the adjacent surface water body. The bottom of the PRB wall will be only a feet below lake level to allow contaminated groundwater to pass through the PRB wall prior to discharge to the lake. Fluid levels will be measured in monitoring wells to ensure water levels inside the contained area remain at or slightly above lake level. Groundwater will only discharge to the lake when water levels are slightly above lake level. (Groundwater will not discharge to the lake when groundwater elevations equilibrate with the lake level because there will be no hydraulic gradient).

Discharge through the PRB wall will be influenced by 1) fluctuating lake levels, and 2) groundwater recharge from infiltration within the contained area. Surface barriers will be used to reduce infiltration into the contained area, which will reduce the volume of water treated by the PRB. However, the PRB could function with or without an impermeable surface barrier.

115. **Section 7.3, Page 7-10, Alternative GW-5, In-situ treatment using PRB:** The last paragraph states that fluid levels in the confined area will be below lake level, presumably to maintain an inward gradient. How will the PRB function if there is no head differential to drive the groundwater through the PRB? Will the groundwater be pumped? Clarify how the PRB will work.

Response

See Response to Comment 113.

116. **Section 7.3, page 7-10, Alternative GW-5 – In-situ Treatment Using Permeable Reactive Barrier Walls:** There probably is a need for hydrogeologic modeling for the PRB. Modeling enables an understanding of the implications of site characterization information and treatability data. Hydrogeologic modeling is normally conducted for PRBs for the following reasons:

- Determine an approximate location and configuration for the permeable barrier with respect to the groundwater flow and plume movement.
- Estimate the expected groundwater flow velocity through the reactive cell.
- Determine the width of the reactive cell and, for a funnel-and-gate configuration, the width of the funnel.
- Estimate the hydraulic capture zone of the permeable barrier.
- Determine appropriate locations for performance and compliance monitoring points.
- Evaluate the hydraulic effects of potential losses in porosity (and potential for flow bypass) over the long term.
- Evaluate the potential for underflow, overflow, or flow across aquifers.
- Incorporate the effects of shifts in groundwater flow direction into the design.
- Incorporate site-specific features such as property boundaries, building foundations, buried utilities, etc., into the design.

Response

These issues were considered when screening potential remedial responses and when developing the conceptual design presented in the FS Report. These issues will be addressed in detail during the design phase.

117. **Section 7.3, page 7-10, Alternative GW-6 – Treatment using Chemical Oxidation:** Is any NAPL removal going to be conducted for the shallow aquifer prior to or during treatment using in-situ chemical oxidation (ISCO)? This would reduce the high oxidant demand caused by the free product, and therefore require a lower reagent dose.

Response

The text has been revised to indicate that passive vent wells could also be used to recover fluids that rise to the surface in response to subsurface chemical reactions. Injected reagent may also behave as a surfactant that could displace NAPL recovered via the vent wells.

In addition, care must be taken that the NAPL in combination with the oxidant (especially peroxide) does not cause a dangerous exothermic reaction.

Response

A pilot demonstration was completed between November 2006 and February 2007 using Cool Ox as the reagent. Monitoring completed at that time indicated that Cool-Ox did not increase subsurface temperature. Use of hydrogen peroxide may result in exothermic reactions. However, if a reagent that results in an exothermic reaction is used, gases will be allowed to escape via vent wells (for soil and shallow groundwater in the filled ravine) or groundwater extraction wells (for the underlying Copper Falls).

118. **Section 7.3, page 7-12, Alternative GW-7 – In-situ Treatment using Electrical Resistance Heating:** A few different possibilities are discussed in the text, but what was the actual approach assumed for this remedy – Is ERH used to heat the surface to near the boiling point of water, or just to 30 to 40 degrees for NAPL recovery? The approach is alluded to in the key components and the figures, but is not specifically stated.

Response

The conceptual design text has been revised to verify these issues. ERH will be used to heat the subsurface to 30^{o} or 40^{o} C so that fluids can be recovered via extraction wells. A figure has also been added to show the layout for ERH in the former coal tar dump area.

119. **Section 7.3, page 7-15, Alternative GW-8 – In-situ Treatment using Steam Injection / Dynamic Underground Stripping / Contained Recovery of Oily Wastes (CROW) Process:** The text is confusing for what is actually proposed as part of the alternative for the Copper Falls aquifer. Several different processes are discussed in the text (e.g. steam injection alone, DUS, HPO, and CROW), and it is not clear which are proposed for this alternative and which simply could be considered at a future time, especially due to the paragraph order.

Response

Steam injection is a thermal treatment process to mobilize NAPL and contaminants. Steam is injected into the contaminated zone through injection wells, and contaminants are removed with via groundwater extraction wells. CROW is a patented in-situ thermal flushing process that uses both steam and hot water injection to remove contaminants recovered via extraction wells. This process was evaluated for shallow soil and groundwater with NAPL contamination.

DUS is a patented thermal flushing process that uses steam and electrical resistance heating (ERH) to mobilize NAPL and contaminants. Steam and ERH are used to heat the plume, which increases the mobility of contaminants recovered by extraction wells. DUS was evaluated for the Copper Falls aquifer because steam injection alone or CROW would require higher injection pressures for this

confined aquifer (compared to the shallow aquifer), and higher injection pressures may fracture the Copper Falls and/or the overlying Miller Creek formation. The Miller Creek is the confining unit for the Copper Falls, and this unit is thinnest where it was dissected by the former ravine (near the former MGP). A breach in this area is believed to be the migration route for NAPL into the Copper Falls, and fracturing the Miller Creek could exacerbate this breach.

As described in the FS Report, Hydrous Pyrolysis/Oxidation (HPO) is a process sometimes completed after contaminants are removed during the DUS phase. HPO consists of steam and air injection, which creates a heated, oxygenated zone in the subsurface. After the injection is terminated the steam condenses causing contaminated groundwater to migrate to the heated zone where it mixes with the condensed steam and oxygen. Although this may destroy some microorganisms impeding natural biodegradation, HPO enhances biodegradation of residual contaminants by stimulating other microorganisms (called thermophiles) that thrive at high temperatures. A pilot test will be needed to evaluate the effectiveness of HPO after DUS.

Further details on these technologies are appropriate for the design phase of this project.

120. **<u>Section 7.3, Page 7-16, Alternative GW-9 and Figure 7-8A</u>:** *It is stated in Bullet 1 that a minimum of 12 extraction wells will be installed in the Copper Falls Aquifer*. How were the number of wells determined? What are the expected extraction rates for each well? The number of wells described in text and shown on the figure does not match.

<u>Response</u>

As shown on Figure 7-8A, the conceptual design assumes a minimum of 12 additional extraction wells spaced on 150 foot centers throughout the DNAPL plume. As with the existing system, low pumping rates (less than 1 gpm) would be expected from each well. The groundwater extraction system shown on Figure 7-8A includes the existing three wells and 12 proposed wells; existing wells and proposed wells are distinguished from one another on this figure.

The well spacing was based on information from the existing NAPL recovery system. The low flow system (less than 1 gpm per well) has resulted in an approximate 10 foot decline in the potentiometric surface near the extraction wells prior to system startup in 2000 (see the RI Report). Consequently, low flow rates (1 to 2 gpm) can be expected from new extraction wells. New extraction wells were also spaced on 150 foot centers throughout the DNAPL plume to prevent a significant decline in the potentiometric surface. As described in the RI Report, strong upward gradients are present in the confined aquifer. These strong upward gradients have resulted in the migration of NAPL along the Copper Falls / Miller Creek contact away from the source area. NAPL may begin to migrate vertically if the potentiometric surface is reduced by excessive pumping.

121. **<u>Section 7-3, Page 7-16: Alternative GW-9 and Figure 7-8B</u>:** Provide a basis for determining number of trenches and trench orientation.

<u>Response</u>

This conceptual design includes a trench parallel to the shoreline transcending the center of Kreher Park. This trench is connected to two smaller lateral trenches that are perpendicular to the shoreline. The western most lateral trench is located in the vicinity of the former open sewer, and the easternmost lateral trench is located in the former coal tar dump area. Groundwater extracted from these trenches

will create a groundwater sink to prevent groundwater from discharging to the adjacent lake. During the design phase, different configurations could be developed to accomplish the same criteria.

122. **<u>Section 7.3, All Alternatives needing groundwater treatment</u>:** For several alternatives the existing groundwater system has been identified to treat the extracted groundwater. An analysis whether the existing groundwater treatment system will be capable of handling the load has not been provided. Also provide the treatment train and outline of testing procedures to meet discharge requirements.

<u>Response</u>

Potential remedial alternatives that will require groundwater management were evaluated for both soil and groundwater remedial alternatives. For soil, removal, ex-situ, and in-situ remediation will require excavation de-watering for a short duration. At the upper bluff, it was assumed that water would be removed from the excavation, held in storage tanks, and treated using the existing groundwater treatment system.

For the Copper Falls aquifer, groundwater remedial Alternatives GW-3 (ozone sparge), GW-4 (dual phase and surfactant injection), and GW-9A (groundwater extraction) incorporate the existing groundwater remediation system. Alternatives GW-6 (chemical oxidation), GW-7 (ERH), GW-8 (steam injection), and GW-9B (groundwater extraction) include additional extraction wells, which will require an upgrade of the existing system to handle increased flow rates. Upgrades will likely include increased capacity for oil and water separation, air striping to remove volatiles, and polishing by carbon filtration prior to discharge. Groundwater extraction rates have been estimated for the purpose of preparing Feasibility Study Cost estimates. For a low treatment volume, continued discharge to the sanitary sewer system could likely be maintained. However, a WPDES permit may be needed for an increase in treatment volume. Regardless, the treatment train required to meet discharge requirements will be evaluated during the design phase.

For Kreher Park, a water budget analysis was completed to estimate groundwater recharge. This analysis was then used to estimate groundwater extraction rates needed to maintain hydraulic control of groundwater for the contained area for the purpose of preparing Feasibility Study cost estimates. Alternative GW-2A (containment) includes a cost estimate for groundwater extraction using partial caps, and Alternative GW-2B includes a cost estimate for groundwater extraction with a complete cap for Kreher Park. Alternatives GW-9A assumes groundwater extraction at a high flow rate (50 gpm) to induce an inward gradient without the use of vertical barriers. These alternatives will also likely require a WPDES permit for discharging treated water.

123. **<u>Section 7.3, Alternatives GW-4, GW-6, GW-7, and GW-8</u>:** These alternatives appear to address only upper bluff and contamination in the Copper Falls aquifer. Shallow groundwater contamination and NAPL in Kreher Park has not been addressed for these alternatives. Therefore these alternatives will address groundwater issues at the site partially. The alternatives should clearly state whether shallow groundwater contamination including NAPL is being addressed for these alternatives or not. Also, the conceptual design for shallow groundwater should be provided.

Response

GW-4 (Dual Phase Recovery and Surfactant Injection) are limited to the Copper Falls aquifer. Use of this technology may not be effective for shallow groundwater encountered in the filled ravine and Kreher Park because of variable permeabilities of fill material.

Alternatives GW-6 (chemical oxidation) and GW-7 (ERH) were limited to areas with DNAPL contamination for shallow groundwater contamination encountered in the filled ravine and Kreher Park, and for the confined Copper Falls aquifer. Although described in the text, a figure was not included to show a conceptual layout at Kreher Park. The text has been revised and additional figures have been added to show the conceptual design for these remedial responses in Kreher Park.

As described in response to Comment 118, steam injection and CROW were evaluated for soil and shallow groundwater in the filled ravine and Kreher Park, and DUS was evaluated for the Copper Falls.

124. **Figures 7-1, and 7-4:** Why is the low permeable cover not being provided for entire coal tar dump area in Kreher Park?

Response

The uncovered section of the former coal tar dump area underlies an asphalt paved section of Marina Drive. Regardless, the figures have been revised to show surface barriers overlying the entire coal tar dump area.

125. **Table 7-2, Alternative GW-2, Upper Bluff Area:** This table needs to be updated to address comments above (#100 – 124) on groundwater alternatives.

Response

Table 7-2 has been revised to address Comments 100 through 124.

126. **Table 7-3, Evaluation of Long-Term Effectiveness and Permanence for Potential Groundwater Remedial Alternatives:** Grouping together alternatives GW-3 through GW-8 (or GW-9?) is too general. For example, the adequacy of controls for all these alternatives list that they would be effective for the Copper Falls aquifer, although this would not be true for Alternative GW-5 (In-situ Treatment using Permeable Reactive Barrier Walls). Further, Alternative GW-5 would likely not result in the "removal of significant volume of NAPL," since the PRB is only a passive treatment for groundwater that flow through it.

Response

This table has been reorganized to include information for groundwater in the filled ravine, at Kreher Park, and in the Copper Falls aquifer. Additional text has been added for Alternatives GW-2, GW-3, GW-4, and GW-5.

127. **Table 7-3, Alternative GW-2:** The fill at the Kreher Park cannot be considered as an engineered barrier as described in several comments above for surface containment. Therefore, the statement that containment of shallow groundwater will reduce long term potential risk to human health and the environment is questionable because groundwater

infiltration into the underlying shallow aquifer will continue and contaminants would continue to leach into groundwater.

Response

For Alternative GW-2, there will be no attempt to improve groundwater quality within the contained area. The primary purpose of an engineered surface barrier will be to prevent direct contact with subsurface contamination. Vertical barriers will prevent off-site migration of contaminants with groundwater. The net effect will be to reduce the long-term potential risk to human health and the environment outside the contained area.

With respect to preventing direct contact with subsurface contamination, infiltration is irrelevant. However, surface barriers can be used to prevent contaminant leaching from contaminated soil in the unsaturated zone. The former coal dump area is the only location where soil contamination is present in the saturated zone, and a clay cap was evaluated for this area for Alternative GW-2. Asphalt pavement was evaluated for the gravel covered marina parking lot to reduce infiltration because this alternative will also require hydraulic control of groundwater within the contained area. Hydraulic control will consist of maintaining the groundwater elevation at or below lake level. This will require removal of groundwater at or above a rate equal to recharge from infiltration. Reducing infiltration will reduce groundwater recharge, and the consequent volume of water removed to maintain water at or below lake level. Infiltration for the remainder of Kreher Park could be minimized by improved storm water management (storm water diversion trenches and retention basins). Installing a clay cap over the entire park would also reduce infiltration, but may restrict future site use.

128. **Table 7-3, Alternative GW-2:** The fill at Kreher Park cannot be considered as an engineered barrier because it will not reduce infiltration. There for the statement that the containment would be effective for shallow groundwater is questionable.

Response

See Response to Comment 126.

129. **Table 7-3, Alternatives GW-3 through 9:** Based on the discussion of the alternatives and Figures several of these alternatives (GW-4, GW-6, GW-7 and GW-8) do not appear to address groundwater contamination in the Kreher Park. The long term effect for these alternatives will be unchanged NAPL and groundwater contamination will still remain in the Kreher Park. Due to site conditions in the Kreher Park several of these alternatives may not be successful in treating the NAPL. In that instance the long term effectiveness of the alternatives becomes questionable.

Response

Alternative GW-4 was not evaluated for shallow groundwater at Kreher Park. The text in section 7.3 has been expanded to clarify the evaluation of Alternatives GW-6, GW-7, and GW-8 for the former seep, former coal tar dump, and TW-11 areas at Kreher Park.

130. **Table 7-4, Alternative GW-2:** Groundwater extraction and treatment will be required and the treatment will slowly reduce contaminant concentration in the Kreher Park area. This should be addressed in this table.

Response

Alternative GW-2 includes removal of contaminated groundwater as a hydraulic control to maintain the water level in the contained area at of below lake level. The source for groundwater contamination will remain if there is no removal of DNAPL from the former seep, former coal tar dump, and TW-11 areas. Containment is not intended to improve groundwater quality; it is intended only to prevent off-site migration of contaminants.

131. **Table 7-4, Evaluation of Reduction of Toxicity, Mobility, or Volume through Treatment for Potential Groundwater Remedial Alternatives:** For the type and quantity of residuals remaining for Alternative GW-9, how will immobile NAPL be removed through groundwater extraction if the NAPL is not mobile?

Response

No matter what remedial response is implemented, a fraction of NAPL (residual or immobile NAPL) will remain. Immobile NAPL is held in place by capillary forces. Groundwater extraction uses water as a carrier to remove dissolved phase contaminants and the mobile fraction of NAPL. Once the mobile fraction has been removed, the immobile fraction remains which in turn continues to dissolve into groundwater. For sites with NAPL, groundwater extraction can be used to remove a significant contaminant mass. However, groundwater extraction will be required for an extended period of time to remove dissolved phase contaminants to the extent practicable after the mobile fraction is removed. Therefore groundwater extraction can be used to achieve compliance with WAC NR 708.13 by removing NAPL to the maximum extent practicable, preventing the migration of dissolved constituents.

132. **Table 7-5, Evaluation of Short Term Effectiveness for Potential Groundwater Remedial Alternatives:** What types of actions to protect the community and site workers during remediation would be necessary and implemented for each alternative? Each alternative may have specific protections required and safety concerns to consider for implementation, as well as varying degrees of risk. Grouping all the alternatives together is too general.

Response

Additional text has been added to Table 7-5 to address this issue. See Response to Comment 80.

133. **Table 7-5, Evaluation of Short Term Effectiveness for Potential Groundwater Remedial Alternatives:** In addition, under "Time Until RAOs are Achieved," note that the RAOs will never be achieved for the Copper Falls aquifer as part of Alternatives GW-2 and GW-5.

Response

Table 7-5 states "No impact to Copper Falls aquifer" for Alternatives GW-2 and GW-5.

Grouping Alternatives GW-3 through GW-8 together for this category may be too general since time frames for various in-situ treatments will vary, especially when comparing active systems to passive treatment (e.g. PRB).

Response

This table is a summary of the short term effectiveness of potential remedial responses for groundwater. A summary of long-term effectiveness for active and passive treatment is included in Table 7-3.

134. **Table 7-5, Alternatives GW-2 through 9:** *For protection of community and workers during remediation it is stated that actions to protect community and site workers during remediation can be implemented.* No specific information has been provided for actions to protect the community and workers.

Response

See Response to Comment 131.

135. **Table 7-5, Alternatives GW-2:** *For environment impact of remedy it is stated that containment will prevent contaminant migration.* This is true only if the water elevation in the containment is kept lower than the water elevations around the containment area.

Response

Hydraulic control within the contained area was evaluated for this alternative.

136. **Table 7-6, Alternatives GW-2:** *For reliability of technology it is stated that containment technology will prevent exposure and contamination migrations via shallow groundwater.* This is true only if the water elevation in the containment is kept lower than the water elevations around the containment area.

Response

See Response to Comment 134.

137. **Table 7-6, Evaluation of Implementability for Potential Groundwater Remedial Alternatives:** It would seem that the wood waste layer would result in more than minor installation problems for Alternatives GW-2 and GW-5, especially if the wood waste layer contains full-size logs and lumber. In addition, containment is not always a reliable technology, especially for difficult or unknown subsurface conditions.

Response

We agree that the wood waste layer may cause impediments during construction. However, the conditions in this layer have been well documented for purposes of this RI/FS. Potential construction uncertainties will be addressed during the design phase.

138. **Table 7-6, Evaluation of Cost for Potential Soil Remedial Alternatives:** Revise the table number and title to "Table 7-7, Evaluation of Cost for Potential Groundwater Remedial Alternatives."

Response

The text in this table has been changed from 7-6 to 7-7.

In addition, why is GW-2 over twice the cost of GW-5? They are nearly identical, except that GW-5 includes a PRB and GW-2 includes "pressure relief wells."

Response

The cost difference is in long-term operation maintenance and monitoring. Alternative GW-2 requires continued removal and treatment of contaminated groundwater at Kreher Park; alternative GW-5 does not.

Why does Alternative GW-5 not include costs for the upper bluff, when Figure 7-4 shows the same asphalt as Alternative GW-2?

Response

The cost for asphalt pavement at the upper bluff area is approximately $35,000. For alternative GW-5, these costs were included with the cost for Kreher Park. The table will be revised by adding $35,000 to the upper bluff shallow groundwater column, and reducing the Kreher Park shallow groundwater cost by the same amount.

Why is Alternative GW-8 less expensive than Alternative GW-7, when based on the text description of GW-8, DUS includes steam injection, electrical heating, underground imaging, and collection/treatment of effluent, whereas GW-7 includes just the electrical heating and collection/treatment of effluent?

Response

This cost difference is related to the estimated time required for operation for each alternative. It is estimated that Alternative GW-7 will require 12 months of operation and Alternative GW-8 will require 6 months of operation.

139. **Table 7-8, Comparison of Potential Groundwater Remedial Alternatives:** Alternative GW-2 likely has no to low (instead of moderate) reduction of toxicity, mobility, and volume through treatment, since nothing is being treated – essentially, the contaminants are just contained.

Response

The relative ranking evaluates all three criteria together. Although containment will not reduce toxicity, it will prevent mobility and reduce volume by preventing off-site migration. Therefore it is considered moderate relative to the other remedial responses evaluated.

Due to the problems posed by the wood waste layer and fill material, as well as the difficulties posed by breaching the confining layer, it would seem that not all of the alternatives are highly to very highly implementable.

Response

Characteristics of the wood waste layer and fill material (and buried structures in the filled ravine) resulted in the elimination of several remedial alternatives. The remaining alternatives evaluated in this report are highly or very highly implementable as evaluated in the FS Report.

In addition, some of the alternatives may be less than highly effective in the short term, due to potential safety concerns and exposures to workers and the community during implementation, especially for more intrusive remedies.

Response

Because potential short term exposure during implementation can be mitigated by implementing controls described in Table 7-5, potential safety concerns are not considered for the effectiveness ranking.

140. **Section 7.5.2, Compliance with ARARs and TBCs:** For alternatives that are not addressing NAPL and contaminated groundwater in Kreher Park, compliance with ARARs for those alternatives is questionable.

Response

Remedial responses for shallow groundwater at Kreher Park include containment of the entire park, or in-situ treatment of DNAPL source areas for shallow groundwater contamination at the park. The RAO for NAPL indicates removal to the extent practicable and/or preventing migration.

141. **Section 7.5.3, Long Term Effectiveness and Permanence:** *It is stated that although risk will be reduced by containment of contaminated material, contaminants will be left on site. Additionally, both are limited to shallow groundwater; neither is a feasible alternative for the underlying Copper Falls aquifer.* Is the contamination in the Kreher Park a source of contamination for the underlying Copper Falls Aquifer?

Response

No. Shallow groundwater is separated from the underlying Copper Falls aquifer by the Miller Creek Formation. The low permeability Miller Creek Formation behaves as a confining unit for the underlying Copper Falls aquifer.

142. **Figure 7-1:** The cap does not extend over the entire area of the former coal tar dump and at a minimum should extend over the entire area of the former coal tar dump. The cap should extend over the entire site to prevent infiltration of precipitation through contaminated soil.

Response

Figure 7-1 has been revised to show the lateral extent of the cap covering the former Coal Tar dump area.

143. **Figure 7-1:** Where is the groundwater diversion trench located on the figure that is mentioned in the text for Alternative GW-2? In addition, see general figure comments regarding figure and legend symbols.

Response

The groundwater diversion trench will be located outside the contained area along the bluff face to prevent groundwater from the upper bluff discharging to the contained area. Diversion trenches are shown on revised Figure 7-1.

144. **<u>Figure 7-1</u>:** The storm water detention basin will allow more infiltration to occur. A storm water management system should be designed to ensure that no ponding occurs.

<u>Response</u>

As described in response to Comment No. 108 above, a storm water basin will be designed to retain water, and thus lined to prevent seepage. Water from the storm water basin will be discharged to Chequamegon Bay via a drainage ditch or outfall pipe shown on Figure 7-1.

145. **<u>Figure 7-2</u>:** The text of Alternative GW-3 mentions that groundwater extraction wells will likely be needed to recover mobilized NAPL. These wells should be shown on the figure as part of the alternative, even if existing extraction wells are used.

<u>Response</u>

Figure 7-2 has been revised to show ozone sparge systems for shallow groundwater in the filled ravine and at Kreher Park, and an ozone sparge system (with extraction wells) at the upper bluff for the Copper Falls aquifer.

146. **<u>Figure 7-3</u>:** The line type colors of the buildings, NAPL, and ravine are very similar, making it more difficult to interpret the figure. In addition, the ravine line type is not defined in the legend, although it is shown on the figure.

<u>Response</u>

Figure 7-3 has been revised to show a conceptual layout of Alternative GW-4. Building outlines are shown in red, and the extent of DNAPL is shown in blue. Because this alternative is limited to the Copper Falls, the ravine line has been deleted

.

147. **<u>Figure 7-3</u>:** Again, the existing treatment system should be shown on the figure (or labeled if already shown) since it will be used as part of this alternative.

<u>Response</u>

Existing groundwater extraction wells have been added for Alternative GW-4 to the revised Figure 7-3, and the treatment building has been labeled.

148. **<u>Figure 7-3:</u>** It seems as though additional injection points are needed to fully cover the extent of NAPL.

<u>Response</u>

Additional injection points have been added for Alternative GW-4 on the revised Figure 7-3.

149. **<u>Figure 7-4</u>:** Show the location of the groundwater diversion trench installation.

<u>Response</u>

Groundwater diversion trenches for Alternative GW-5 are shown on revised Figure 7-4.

150. **<u>Figure 7-5B</u>:** Show the location of the existing extraction wells in addition to the new proposed – label accordingly.

Response

Existing groundwater extraction wells have been added to the revised Figure 7-5C (replaces Figure 5B), and the treatment building has been labeled for Alternative GW-6.

151. **Figure General:** A figure would be helpful showing the location and details of the chemical oxidation at Kreher Park completed in the former coal tar dump area.

Response

Figure 5B has been added to show chemical oxidation (Alternative GW-6) at Kreher Park.

152. **Figure 7-6A:** In the legend, how can "SVE wells" be passive? If they are passive vent wells, then they are not actively extracting vapor from soil (i.e. SVE). If these 10 wells are the passive vent wells, then also show the 4 extraction wells.

Response

The text in the report and on the figure has been changed from "SVE wells" to "passive vent wells". The vent wells will allow for vapors to escape when the saturated zone is heated, and recovery wells will be used to remove fluids. Figures 7-6A and 7-6B have been changed to show to show the conceptual layout using Alternative GW-7 at the upper bluff and at Kreher Park, respectively. Both conceptual designs include 10 vent wells and four recovery wells in each area.

The conceptual design described in the revised FS Report uses passive vent wells for vapors, recovery wells to remove fluids, and electrodes to heat the plume to enhance NAPL recovery. Passive vent wells may not be needed. Additionally, ERH may also be accomplished by combining electrodes in the same boring as extraction wells, which would require groundwater extraction from numerous small diameter wells rather than from a few groundwater extraction wells. These details will be addressed during the design phase.

153. **Figure 7-7A:** Where is the Kreher Park area? Also, the number of wells shown on the figure is not consistent with the text description.

Response

Figure 7-7B has been added to show Alternative GW-8 (steam injection) at Kreher Park. The text has also been corrected to describe the number of injection and recovery wells at Kreher Park (shown on the revised Figure 7-7B), and at the upper bluff (shown on the revised Figure 7-7A). Alternative GW-8 for the Copper Falls aquifer is shown on the revised Figure 7-7C.

154. **Figure 7-7B:** Is steam injection alone proposed for the Copper Falls aquifer, or is the combination technology of DUS proposed as indicated by the text? The figure seems to only show steam injection and steam recovery, whereas DUS incorporates several different technologies not shown on the figure. Are the recovery wells for steam as indicated by the figure legend, or are they for recovery of NAPL and groundwater?

Response

As described in response to comment No 118, Alternative GW-8 includes steam injection for shallow soil and groundwater. Steam injection and recovery wells for shallow soil and groundwater at the upper bluff and at Kreher Park are shown on revised Figures 7-7A and 7-7B, respectively.

As described in response to Comment 118, DUS is a patented thermal flushing process that uses steam and electrical resistance heating (ERH) to mobilize NAPL and contaminants. DUS was evaluated for the Copper Falls aquifer because steam injection alone would require higher injection pressures for this confined aquifer (compared to the shallow aquifer), and higher injection pressures may fracture the Copper Falls and/or Miller Creek formation. For the Copper Falls, the conceptual design shown on Figure 7-7C show steam injection wells, and DUS recovery wells. Wells installed for the ERH electrodes can also be used as DUS recovery wells.

155. **Section 8, Sediments:** A "dry dredge" alternative should be considered. For example, if you are willing to construct a sheet pile wall for a CDF remedy, it would also make sense to put up a sheet pile wall to help "dry out" a portion of the bay so that it would be easier to excavate (dredge) the contaminated areas. This should be looked at as either a winter or summer alternative. The discussion should include seasonal options such as winter versus summer removal and impacts.

Response

A "dry dredge" alternative was included only as a nearshore component of a removal alternative in the Comparative Analysis of Alternatives Technical Memorandum. We eliminated it as a site-wide alternative because it was not cost effective. EPA did not comment at that time. However, the dry-dredge alternative has been added to the revised FS Report in accordance with discussions at and subsequent to the March 3, 2008 meeting.

156. **Section 8, Sediments:** Table 8-2 Evaluation of Long-term Effectiveness and Permanence for Potential Remedial Alternatives for Sediment, overstates the "Adequacy and Reliability of Controls", or permanency of options SED-2 and SED-3. If a CDF is constructed on the lakebed it would be through a lakebed grant by the Legislature, or as a bulkhead line or lease pursuant to Section 30.11 or 24.39, Wisconsin Statutes. A bulkhead line can only be created by the City when it's in the "public interest," and a lakebed lease can only be entered into with a local unit of government (the City of Ashland, or Ashland County) for specified purposes and can only be granted for 50 years. Fifty years or two and one-half generations may not be considered permanent. It is difficult to predict whether a lakebed grant could be "re-granted" for either SED-2 or SED-3. This future speculation makes it difficult to determine the permanence of this option. The technologies involved in SED-2 and SED-3 may have been used before at other sites. However, these technologies have never been used on sites with free product. Because these technologies have never been used at free product sites the permanence of the technology may be overstated both technically and at an administrative level.

Response

More detail has been added to the FS. This includes a better description of how location and design are consistent with Superfund criteria. In addition, the FS has been expanded to include a discussion outlining the steps taken to pursue approvals needed for the CDF, including a discussion of the following:

1) ***NR 504 landfill siting exemptions(as opposed to siting criteria) for an upland CDF;***
2) ***An exemption issued pursuant to paragraph 30.12, Stats;***
3) ***A legislative lakebed grant; and***

4) A lease with the Commissioner of Public Lands

For the SED-4 option the narrative within the table includes a discussion of the potential short term release of VOCs during sediment excavation. Table 8-2 relates to the "Evaluation of Long-term Effectiveness and Performance" not the short term release and as such the narrative should be moved to table 8-4 Evaluation of Short Term Effectiveness.

<u>Response</u>

This change has been made to the FS.

The tables in Chapter 8 are out of order and some appear to be mislabeled. On page 8-19 the table is labeled as table 8-4 and 8-3. The table on page 8-24 is labeled as 8-3 but it follows table 8-6 on page 8-23. Please revise the table labeling in Chapter 8.

<u>Response</u>

The labeling on these two tables has been corrected.

157. **<u>Section 8.3, Development of Potential Remedial Alternatives for Sediment:</u>** Page 8-5. The CDF will eliminate approximately six acres of open water of Lake Superior which is protected under the Wisconsin Public Trust Doctrine and held in trust for the public (see Wisconsin Public Trust discussion below).

Page 8-5. The document states, "compensatory mitigation for wetland loss would be required" for the loss of open waters of Lake Superior. There is no applicable mechanism for mitigation of loss of public lakebed. References to mitigation/restoration projects on Page 8-6 are also inappropriate for consideration as there are no mechanisms or provisions in state statute for the "trade-off" of lakebed for other restoration projects or access easements.

Page 8-5. The document states, "[t]he design of the CDF would be compatible with the recreational nature of the near shore area and incorporate features that will enhance both recreational use of the area as well as wildlife usage". There is a concern with that statement. While a CDF would change or modify recreational uses, dredging would actually enhance or restore previous recreational uses. This would allow greater flexibility to enhance near shore recreational opportunities in the future.

Page 8-5. The references to "grassland habitat" and management "for recreational use by the public, i.e., boaters, fishers, birdwatchers, etc." are interesting concepts but inconsistent with the loss of lakebed associated with the filling of open water for a CDF. These recreational uses referred to currently exist in the area and there will be an irreversible loss of open water and its associated recreational uses and ecosystem functions if a CDF is constructed.

Page 8-5. The Ashland Waterfront Development Plan does not contemplate construction of a CDF as part of a plan to expand their marina as the document suggests. In fact, the Waterfront Plan shows expansion of marina slips into the very area that NSPW is proposing for the location of the CDF.

Page 8-7. As described in the section on Subaqueous Capping, the result will be changes to the shoreline and open water area as "approximately 20,000 cy of clean fill and riprap will be placed in the near shore area." Human usage, habitat values, and the natural character of the shoreline will all be altered with this alternative.

Page 8-8. The document acknowledges that dredging is technically feasible for this site and has been successfully implemented alternative at other sites.

Response

These points are acknowledged.

158. **Section 8.3.2, page 8-4, Alternative SED-2, Sediment Containment with a Confined Disposal Facility:** On Figure 8-2, it shows sheet pile installation, yet this is not mentioned in the text.

Response

The text has been amended to reflect the presence of sheet piles.

159. **Section 8.3.2, Alternative SED-2: Sediment Containment within a Confined Disposal Facility:** There is a concern about the treatment of water within a CDF. Information is needed on the water management issues within the CDF including how the water is managed, treated and discharged. The FS refers to drainage wells or wicks within the CDF and drain tile at the upland side. Upon reviewing the cost estimates, it appears a carbon filtration treatment system for water during construction is being considered, but no details are provided. There is also a concern about whether the CDF can be dewatered enough to make it stable to support the cover and prevent water and contaminants from migrating into the cover. In addition, there are concerns that once the initial dewatering ceases, water will re-enter the CDF thereby compromising the integrity of the cap and the entire remedial alternative. There appears to be no method to either monitor the amount of infiltration or remove the water if it enters the CDF.

Additional information is needed on: how will groundwater on the up-gradient side of the CDF be collected, treated and discharged? Where will the sheet pile be installed other than along the newly created shore line? Will it be installed on all sides of the CDF during construction? Figure 8-2 only shows it on the lake side and along the RR tracks. What sort of sheet pile will be used? Will the sheet piling be sealed to prevent contaminant migration?

Exactly what areas will be capped? How will the cap be sloped? How will drainage be managed? More details on how the cap will be maintained are needed.

Looking at this section, the drawings and the summary of the bench testing results, please address how the CDF design will be effective in preventing exposures and contaminants from migrating in the long term. Notwithstanding the design and location requirements in NR 500 (discussed below), it appears that the following potential problems have not been adequately addressed in the FS:

- Leakage through the sheet wall due to inadequate sealing and/or corrosion/deterioration. What will a major storm due to this structure? Was a storm of a certain type and magnitude looked at and considered for the design? Were wind speeds, wave height and precipitation events documented and the impacts these may have on the sheet wall? Does the sheet wall alternative take into consideration Lake Superior lake levels declining as well as potentially rising? What if there is a major storm as well as a significant rise in lake levels?

- Rising lake levels causing additional saturation of the waste and inundation of the cover.

- Inadequate dewatering and stabilization of the wastes causing cover saturation and/or structural failure. The description of the bench testing done does not prove with certainty that there will not be cover saturation and/or structural failure of the CDF if there is inadequate dewatering or waste stabilization. The bench scale test used only small amounts of material and may not be indicative of the conditions faced in a CDF.

The alternative does not contain a gas collection system. Gas generation may cause cover vegetation stress, cover deterioration or even structural failure if large gas pockets form. A large amount of untreated significantly contaminated material is going to be placed and covered in this area. The submittal should address the potential bacterial decomposition and associated gas generation. The testing summary stated: "Ebullition (gas release) in the underlying wood layer during the consolidation period is possible, however, conditions would no longer favor gas releases after the relatively rapid consolidation of the wood layer and the dredged slurry layer that would take place during the slurry deposition and cap placement time, say 180 days." What documentation exists to support that these conditions will not be favorable for gas generation after 180 days?

There is still a concern regarding the construction of a CDF on the bed of Lake Superior with significantly contaminated material, and with NAPL present.

Response

Many of the details raised in this comment are appropriately addressed during Remedial Design. Since the technology for construction of CDFs is well understood (See Attachment 3 to the "Comparative Analysis of Alternative Technical Memorandum" URS 2007), and there are several precedents for using CDFs for containment of contaminated sediment, NSPW does not believe it is appropriate to provide this level of detail in an FS. However, NSPW has revised the description of the CDF to provide more engineering detail that addresses some of these comments. With regard to the siting of an NR500 facility such as a CDF, please see response to General Comment 3.

160. **Section 8.3.2 Alternative SED-2:** This alternative proposes building a hazardous waste landfill on Kreher Park and on 6 acres of Lake Superior lake bed. No leachate collection system is proposed for this landfill and no gas collection management system is proposed to depressurize the landfill from build-up of landfill gas. No water treatment system is proposed to treat the groundwater extracted to maintain an inward gradient. Due to the nature of the dredged fill material it will take years before the material acquires enough strength to support a cap. Differential settlement across the site may make the site unusable for any type of recreational activity for years.

Response

See Response to Comment 158.

161. **Figure 8-2:** The depiction of trees on the cap in Fig. 8-2 is misleading, tree root systems require a much deeper soil layer than is being proposed here and would compromise the integrity of the cap, and therefore, trees are not typically plated on a RCRA Class C or D cap.

Response

The conceptual drawing has been modified to depict landscaping and shrubbery more appropriate for placement on a CDF cap. During the Remedial Design stage an evaluation of potential impact of root systems will be conducted.

162. **Section 8.3.2, Page 8-4, Alternative SED-2:** Provide conceptual cross-sections for the caps described in this section.

Response

These are provided in the revised FS.

163. **Section 8.3.2, Page 8-4, Alternative SED-2:** The approval to build a CDF in the lake bed could face significant legal and regulatory hurdles that probably will cause significant delay in implementation. As a threshold matter it is unclear this alternative is protective or meets ARARs and TBCs. Provide details about how and when NSPW will seek approval for a CDF. Whether a CDF has approval is an important factor as to whether this alternative can be implemented. The acceptance of this alternative by the State and community is also questionable at this time.

Response

Please see Response to General Comment 3.

164. **Section 8.3.2, Alternative SED-2:** Why are the O&M costs the same for the CDF as for the other alternatives? Won't there difference in O&M cost for each alternative?

Response

NSPW believes that post construction costs will be relatively similar for all alternatives and that is a reasonable basis for comparing alternatives. During the Remedial Design, this estimate will be refined.

165. **Section 8.3.2, Page 8-6, Alternative SED-3:** In bullet Item 1 it states, *"Determine the area of sediment containing significant wood debris and free-phase material with concentrations of PAH greater than 9.5 PAH/g dwt at 0.415% OC.* Show extent of this area on a figure using RI information.

Response

Figure 3.3 depicts that approximate area. Although this depiction is based upon 10 ppm it is adequate for FS estimating purposes.

166. **<u>Section 8.3.2 and 8.3.3</u>:** How will the RAO for removal of NAPL be addressed for the CDF and capping alternatives?

<u>Response</u>

This will be determined during the Remedial Design. A waiver of this RAO will apply for NAPL contained under or in the CDF as part of the landfill permitting process.

167. **<u>Section 8.3.3, Alternative SED-3</u>:** Provide a rationale for selecting 4-feet depth of excavation for sediments. Does 4-feet depth of excavation guarantee removal of all free product.

<u>Response</u>

A four foot depth was selected because the requirements of cap design, i.e., prevention of contaminant transport and armoring to prevent ice damage will likely require a cap of four feet. The actual cap depth will be evaluated during Remedial Design and the dredge depth adjusted accordingly.

168. **<u>Section 8.3.3, Alternative SED-3: Subaqueous Capping:</u>** The capping alternatives should include design for preventing damage by navigation including anchor dragging, scour from boat motors, and boats running aground as well as natural occurring erosion from storms and ice damage.

<u>Response</u>

These requirements for cap performance were considered in the conceptual design described in the FS. As stated on page 8-6, "The shallow nature of nearshore portions of the Site requires that some dredging be completed prior to capping so that the cap remains subaqueous and doesn't interfere with navigation or recreational boating. In addition, because of the location, the cap would have to be armored to resist erosion from waves or ice damage." The actual cap design will be evaluated during Remedial Design.

In January 2008, NSPW submitted the ADDENDUM 1 CAP FLUX TEST - EXTENDED DURATION COLUMN bench scale study report for review. The report, which presents additional results of the Cap Flux treatability study for the Ashland/Northern, states:

As part of the test protocol, a sediment column capped with three feet of sand was allowed to run an additional three months (six months total) to compare to the results of a similar column which only ran for three months. The primary differences observed in the six month test included the following:

1) The rate of gas generation increased substantially after three months;
2) More gas was generated in the last three months than in the first three months; and
3) At the termination of the six month test, somewhat higher levels of PAHs and VOCs were measured in both the bottom and top of the sand cap compared to what was measured after three months.

Although after 6 months the concentration of VOCs and PAHs were below the cleanup goals prescribed for the sediments in the test there were increasing trends which raise concerns over the long term effectiveness of the cap. The ability of these caps to perform as a permanent solution seems questionable.

Response

This comment is noted. Long term performance of the cap will be addressed during Remedial Design.

169. Section 8.3.3, Alternative SED-3: Subaqueous Capping and 8.3.4 Alternative SED- 4: Removal: The descriptions and cost estimates for these two alternatives do not adequately take into account the final landfill deposition. While the narrative discusses off-site landfilling, there is also a section on siting and constructing a new landfill in the area for the material and an evaluation of a new landfill in Appendix C. NR 500 Wisconsin Administrative Code outlines the requirements for siting a new landfill. It should be noted that designing, siting and approval of a new landfill site may take considerable time that will have to be accounted for in the project schedule. Please see comments on Appendix C.

Response

This comment is noted. Costs for design, permitting and siting a NR 500 landfill are included in revised Appendix I (formerly Appendix C). It is noted that as this process will be part of a superfund action, it may take less time; however, the costs will be reviewed and amended if necessary.

170. **Section 8.3.4, Alternative SED- 4: Removal:** The description in this section and the figures provides very little detail. What is the aerial extent of dredging? Where will the dewatering and water treatment ponds or structures be located? Will there be room for them near the shore? If there is inadequate space near the shore, will an inland site be needed?

Response

This comment is noted. More detailed descriptions of this alternative have been provided in previous technical memoranda. The revised FS has been amended with this information and a copy of the technical memoranda appended to the FS. As indicated on page 8-7 of the FS, the targeted sediments are those within an area where concentrations of total PAHs are greater than 9.5 µg/kg @ 0.415% OC. This approximate area was depicted on Figure 3-3. Whether there will be adequate room in the Kreher Park area will be determined during Remedial Design.

171. **Section 8.4, Detailed Analysis of Retained Remedial Action Alternatives – Sediment:** Page 8-11. The mechanism normally used for construction of a CDF is a lakebed grant from the Legislature. Lakebed grants and submerged lands lease alternatives discussed here all involve a finding that the proposed fill or structure is in the "public interest" or enhances a Public Trust purpose. The other mechanisms are Section 30.11, Stats., which allows municipalities to establish, with DNR approval, "bulkhead lines". Such lines must be determined to be in the "public interest" by DNR and "shall conform as nearly as practicable to the existing shore."

The other mechanism is a "lease" from the Board of Commissioners of Public Lands under Sections 24.39 and 30.11, Stats. Leases can only be granted for limited, specified purposes, which are outlined in sub. 24.39, Stats. These include, for a municipality, "improvement or provision of recreational facilities related to navigation for public use" and for riparian owners, "[i]mprovement of navigation or for improvement or construction of harbor facilities."

Lake bed grants and leases can only be issued to a municipal government which would require the cooperation of the City. The proposed CDF will have a difficult time meeting the intent of sub. 24.39 Stats. This raises the issue of who will be responsible for long term maintenance particularly if there is a major failure of the CDF and a release to environment? The City as grantee or owner of the CDF (required by statute) would potentially incur long-term liability. Funds would need to be set aside to cover needed inspection and maintenance of the facility in perpetuity and should be factored into the cost estimate. Further CDF analysis is necessary to demonstrate that the stability and longevity of a CDF will result in a permanent solution.

Page 8-12. Comparisons between the Ashland Superfund site on Lake Superior and the Lower Fox River site are difficult as there are significant differences between Lake Superior and this riverine system and its associated pollutants, morphology, and water quality.

The Wisconsin Public Trust Doctrine established in Article IX, Section 1 of the Wisconsin Constitution, as interpreted by the Wisconsin Supreme Court and the Attorney General, requires that any development that involves the filling of lakes and streams must be substantially related to navigation or its incidents. The State holds navigable waters in trust for all of its citizens and is responsible for protecting commercial and recreational navigation and public rights in navigable waters, including boating, fishing, hunting, swimming, and enjoyment of natural scenic beauty. Prevention of pollution and unhealthy conditions and protection of fish and wildlife habitat are among other public interests that the State is responsible to protect for the public.

References to other in-water CDF's in Wisconsin are based on each fact situation and the nature and characteristics of the sediment and pollutant levels at each location. The State has been consistent in its approach on similar projects involving Wisconsin waters of Lake Superior and its tributaries including the St. Louis River Duluth Tar Superfund site and Newton Creek-Hog Island Inlet. In all of these sites the polluted sediments were or will be removed to an acceptable level by dredging to permanently remove contaminants from the bed of the waterway. A new confined disposal facility has not been sited in many decades in part because of public opposition and technical questions about the permanence and environmental acceptability of in-water disposal. There have been no cases where a CDF has been approved that permitted on land solid wastes to be deposited on the lake bed in Wisconsin waters. As previously stated, there is not adequate data to compare the true design, maintenance and long-term costs of each of the proposed alternatives.

Response

Please see the Response to General Comment 3.

172. **Section 8.4.1.1, Overall Protection of Human Health and the Environment:** This section has no analysis of protectiveness for any of the sediment alternatives. That seems to be further discussed in 8.5.1, which will be commented on below. Refer to the actual section where the discussion takes place.

Response

This reference to Section 8.5.1 is included in Section 8.4.1.1.

173. **<u>Section 8.4.1.2 Compliance with ARARs and TBCs:</u>** General - there is very little specific discussion in this section about how each alternative meets ARARs. The text refers to Table B-3 in Appendix B, but that only outlines what the ARARs are and has a "yes" or "no" about whether the ARARs apply and if the alternative complies with it. There is a lack of specific details on how a number of important ARARs are met. A discussion on how each alternative meets the ARARs will be required for a complete and thorough review.

For Alternative SED-2, the NR 500 series of Wisconsin Administrative Codes is an ARAR for this alternative because a CDF which contains dredge material and solid waste is a solid waste disposal facility. Landfill location, performance, design and construction criteria will have to be met along with all other applicable portions of the NR 500 series of Wisconsin Administrative Codes.

For Alternative SED-2 –CDF, Removal and MNR, the substantive requirements of NR 500 series of Wisconsin Administrative Codes are applicable to a CDF that is receiving new material. This includes the location and design standards. There is no discussion that outlines how this alternative meets those requirements. As mentioned before, a discussion on how each alternative meets the ARARs will be required for a complete and thorough review. Table B-3 says all the sediment alternatives meet NR 500-520 with no further discussion. This alternative might not meet all of those requirements. A thorough discussion of how each alternative meets the ARARs should include discussion on CERCLA ARAR waivers or NR 500 exemptions if those ideas are being considered. NSPW identified the NR 500 beneficial reuse section as a TBC in table B-3 and indicated that it doesn't apply; please provide justification as to why it will not apply in the narrative.

<u>Response</u>

Please see the response to General Comment 3.

The lack of specificity for how air and surface water quality standards will be met during dredging implementation is also a problem. However, this lack of specificity for how air and surface water standards will be met is a problem common to all the sediment alternatives that involve dredging except for the no action alternative. There is a need to address any air issues, including volatilization, associated with sediment management in impoundments or the CDF until the material is covered or capped.

<u>Response</u>

NSPW believes these issues have been addressed adequately in a conceptual manner in the FS and previous technical memoranda. Details on such things as how technology and procedures will be employed to meet specific design objectives such as compliance with ARARs will be fully developed during Remedial Design.

For Alternative SED-4 – Removal, Treatment, Disposal and MNR, how will: "Treated sediment would be sent off site for beneficial reuse" be done? Doesn't the FS call for the treated sediment to go to an NR 500 landfill? A distinction needs to be made between "clean" overburden sediments and contaminated sediments and the final disposition of these two materials.

Response

Treated or "clean" sediment will be either sent to an off-site demolition landfill (NR 503) or used for beneficial reuse. Untreated sediment that does not meet the characteristic of hazardous waste will be disposed in a solid waste landfill (NR 504).

174. **Section 8.4.1.2, Compliance with ARARs and TBCs:** For Alternative SED-2 a CDF is being considered. CDF is quite simply just another name for a landfill. A CDF is typically constructed off shore for containment of clean material dredged for navigational purposes. The alternative SED-2 involves, in this case, removal of contaminated soils and waste NAPL from the upper bluff area and removal of contaminated sediments and waste NAPL from the lakebed and permanently taking, permanently filling in both Kreher Park and 6 acres of Lake Superior lake bed, waters of the State of Wisconsin, in what clearly can be best described as a landfill. It would be a landfill to contain hazardous waste and would be subject to Wisconsin NR 500. This alternative must describe how it meets the requirements for a landfill under NR 500, especially the requirements for location of a new landfill. If the CDF does not meet NR 500 requirements it will not meet ARARs.

Response

Please see the Response to General Comment 3.

175. **8.4.1.2 Compliance with ARARs and TBCs:** Examples of aquatic CDFs have been cited. The CDFs cited are for sediments that were removed to improve water navigation, construction of harbor facilities, and recreation. The sediments in the CDFs cited have no or very low levels of contamination. The sediments being removed at the site contain free-product NAPL and highly contaminated sediments. Therefore, construction of an aquatic CDF in the lake will face significant technical, and legal hurdles and construction of such a CDF will likely cause significant delays.

Response

NSPW disagrees that CDFs have only been used for clean sediment or sediment with low levels of contamination. Please refer to those CDFs cited in the table accompanying Attachment 3 to the Comparative Analysis of Alternatives Technical Memorandum.

It is acknowledged that construction of a CDF may face legal hurdles.

176. **8.4.2.1 Long Term Effectiveness and Permanence:** Table 8-2, Evaluation of Long-term Effectiveness and Permanence for Potential Remedial Alternatives for Sediment, should be modified to account for comments 157 and 158, above. The minimal descriptions and design information provided in this report do not address the questions and issues related to how well the implemented controls will perform over time and prevent contaminant migration.

Response

This table has been amended where necessary with information previously presented in Attachment 3 to the Comparative Analysis of Alternatives Technical Memorandum as well as other appropriate information.

177. **Section 8.4.2.3, Short Term Effectiveness:** Page 8-21, the report describes the potential for volatilization of contaminants during dredging and discusses control measures concluding that there are "no practical engineering controls". The report should mention that there are options for controlling volatilization and exposure to the community including the timing of work activities to favorable wind conditions and performing the work during colder weather periods that are less favorable to volatilization. Other MGP sites have successfully managed air emissions from sediment and soil cleanups. There are also options including hydraulic dredging into a controlled environment where emissions can be managed. Odors/emissions remain a very significant concern to the Ashland city residents and have to be more adequately addressed.

Response

This comment cites to an incomplete transcription of the text and misinterprets the intent. The complete passage states, " *While engineering controls can be implemented during most remedial activities, there are some activities for which there are no practical engineering controls. For instance, beyond techniques that can be employed by the dredge operator to minimize exposure of sediment to air, there is little precedent for implementing engineering controls for volatilization at the dredge platform*." ***This section also summarizes (in Table 8-5 and 8-6) a number of controls and potential controls that will be considered during Remedial Design. Regardless, it is acknowledged that not all air emissions can be completely managed. At Stryker Bay, a Superfund Site two hours west of Ashland, the potential for unacceptable air emissions resulted in a modification to the remedy.***

The description in this section and the figures provide very little detail. What is the aerial extent of capping? What areas will be dredged? Where will the dewatering and water treatment ponds or structures be located? Will there be adequate space for them near the shore? Which capping design will be used? How will it prevent contaminant migration? How exactly will it be armored? Lake Superior is subject to severe storms, ice damage, and erosion. How will these specific factors be accounted in the design?

Response

NSPW does not believe it is appropriate to provide this level of detail in an FS. However, NSPW has revised the description of the CDF to will address some of these comments by providing further conceptual details of the alternatives.

179. **Section 8.4.2.4, Implementability:** Table 8-3. Evaluation of Reduction of Toxicity, Mobility, or Volume through Treatment for Potential Remedial Alternatives for Sediment:

The reliability discussion for SED-4 seems to be for SED-2 - is this a typo?

Response

Yes, and it has been corrected in the revised FS.

Obtaining the legal and administrative approval for a CDF calls into question the feasibility of SED-2 (see discussion in 163 above). SED-2 doesn't seem to comply with ARARs; including NR 500 (also see comment 180).

Response

See Response to General Comment 3.

180. **Section 8.5.1, Overall Protection of Human Health and the Environment:** Given comments 159 and 168 above, it appears that the overall protectiveness of SED-2 and 3 are in doubt over the long-term. Any further assessment of SED-2 and SED-3 will require superior designs to assure adequate protection.

Response

NSPW believes that both SED-2 and SED-3 are protective in the long term. This discussion has been amended with information presented previously in the Comparative Analysis of Alternatives Technical Memorandum as well as other information to this section.

181. **Figure 8-2**: Why are trees shown on the RCRA class C or class D cap? This would seem to counteract the benefit of the cap, since the root system of full-size trees could potentially damage the cap and cause migration pathways through the soil.

Response

The conceptual drawing has been modified to depict landscaping and shrubbery appropriate for placement on a CDF cap. During the Remedial Design stage an evaluation of potential impact of root systems will be conducted.

182. **Figure 8-3**: It would be helpful to show on this figure (or a similar figure) the proposed location of the CDF in plan view – or will it encompass the entire recreation area? Note that constructing a CDF with a RCRA cap may limit the types of structures and vegetation can be placed in this area (i.e. may be limited to grassy vegetation and low-impact structures, like trails and picnic tables, etc) – this point should be mentioned in the text, as it may affect future development plans, especially within the civic and commercial redevelopment areas.

Response

The description and conceptual depiction of the CDF has been revised to address these comments in the revised FS.

178. **Figure 8-5:** What kind of subaqueous cap is proposed for this alternative? Showing one general schematic for a cap specific to the site would be more helpful than showing several different examples of caps from various other sites. Even if the exact type and details are still to be determined, what is assumed for cost purposes? In addition, it would be helpful to show the proposed subaqueous cap location as a figure in plan view.

Response

The description of the subaqueous cap has been modified in the revised FS to be more specific to the Site.

179. **Figure 8-6:** Showing the proposed sediment removal area in a plan view on a figure would be helpful, possibly combined with the subaqueous cap location figure if they are the same area. Even if the exact area is yet to be determined pending additional sampling, what was assumed for cost purposes?

Response

The FS has been revised to show both the approximate area of the removal area and the subaqueous cap location. Table 3-1 in Section 3.3 provides information on the bases for costing.

180. **Table 8-2, Alternative SED-2:** In the long-term SED-2 may not be effective because the sheet pile could deteriorate, fail and require replacement.

Response

The structural aspects of potential sheet pile deterioration or failure will be addressed in the CDF design during Remedial Design. With regard to contaminant control in the long term, as discussed in Attachment 3 to the Comparative Analysis of Alternatives Technical Memorandum, a CDF is largely self-sealing as it consolidates. This aspect will also be evaluated during Remedial Design.

181. **Table 8-2, Alternatives SED-3 and SED-4:** The risk of increased exposure to the nearby residents will be for short term and most likely only when highly contaminated sediments and free product is removed.

Response

NSPW requests the Agency provide specific examples of the basis for this opinion.

182. **Table 8-4, Evaluation of Short Term Effectiveness for Potential Remedial Alternatives for Sediment, Pages 8-19 to 8-20:** Revise the header of this table – two headers/titles are currently listed.

Response

This has been corrected.

183. **Table 8-4, Alternatives SED-3 and SED-4:** The risk of increased exposure to the nearby residents will be for short term and most likely only when highly contaminated sediments and free product is removed.

Response

NSPW requests the Agency provide specific examples of the basis for this opinion.

184. **Table 8-4:** *It is stated that if sediment is disposed off site without treatment, environmental liability is simply transferred to another location, thereby potentially impacting its new location.* Doesn't this apply to alternative SED-3.

Response

Yes, this also applies to SED-3.

If the landfill is well designed and constructed (with liner, leachate and gas collection systems) the environmental impact could be controlled.

Response

Agreed.

185. **Table 8-3, Evaluation of Reduction of Toxicity, Mobility, or Volume through Treatment for Potential Remedial Alternatives for Sediment, Pages 8-24 to 8-25**: Revise the table number and header of this table to "Table 8-7, Evaluation of Implementability for Potential Sediment Remedial Alternatives."

In addition, installation of sheet pile through the wood waste layer for the CDF might be difficult from a technical feasibility aspect.

Response

This has been corrected. It potentially may be difficult to install sheet pile through wood waste, but it can be done.

186. **Table 8-3, Page 8-24:** The reliability of Alternative SED-3 is doubtful because free product could migrate upward through the cap over a long term period (note: the bench scale testing is considered for a short term and results of the testing cannot be extrapolated for a long term type of remedy).

Response

This will be addressed during the Remedial Design. There are amendments that can be used in the cap material to significantly decrease the potential for contaminant transport. In addition, the consolidation of the cap will result in decreased permeability of the cap material.

187. **Figures General:** Fig. 1-2 SITE FEATURES - The pipe that discharged from the MGP area to the historic lakeshore and later the seep area is shown on the map as a line but is not labeled. There is a "note" at the bottom of the figure that states "Former MGP features are shown on Fig. 1-3". There is no Fig. 1-3 in the draft FS although a figure depicting the MGP facility would be helpful.

Response

Figure 1-3 has been added to the FS Report.

Fig. 3-1 LATERAL EXTENT OF SOIL CONTAMINATION IN UPLAND AREA AND KREHER PARK
The green line that depicts the extent of soil contamination in the Kreher Park and upland areas needs to be connected. There is no clean area along the railroad grade as depicted in the drawing.

Response

Figure 3-1 has been revised to show the lateral extent of soil contamination at Kreher Park and at the upper bluff area.

Fig. 3-2 LATERAL EXTENT OF SHALLOW AND DEEP GROUNDWATER CONTAMINATION
Again for both the shallow and deep groundwater contamination plumes, the areas below the upper bluff and Kreher Park need to be connected. There is no clean area below the railroad grade.

Response

Figure 3-2 has been revised to show the lateral extent of shallow and deep groundwater contamination.

Fig. 3-3 AREA OF IMPACTED SEDIMENT
The key shapes do not match the map shapes for contaminants. At each sample location the color of the highest concentration from that location should be the color noted on the map.

Response

Figure 3-3 has been revised to show contaminant ranges for all samples at all depths. This causes the color-coded contaminant ranges to "stack" on the figure, representing the corresponding two-foot sample interval. The higher levels are displayed with wider diameter circles, so all ranges are represented.

188. **Figures General:** Some of the symbols did not print out properly, such as the north arrow and the legend symbols, which makes it difficult to interpret the figures.

Response

Figures have been revised, and all figures include north arrows and legend symbols.

189. **Figures General:** More description is needed in the legends or the notes of the figures to identify the features (historic, existing, proposed, etc) and describe how various extents (contamination, excavation, etc.) were determined.

Response

Figure 1-3 has been added to show MGP features and Figures 3-4 and 3-5 have been added to show extent of DNAPL.

190. **Figures General:** Several alternatives mention using the existing on-site treatment system. Where is this system currently located? It would be helpful to show on the figures, especially for alternatives that will use the existing system for treatment.

Response

The NAPL Recovery / Treatment Building has been labeled on all figures that include the existing on-site treatment building.

191. **Figures General:** It would be helpful to include some potentiometric maps and geology cross sections with the figures of this report. Even if they are already in the RI, it would be beneficial to include just a few representative ones with the FS to make it a stand-alone document.

Response

The FS Report is not a stand alone report; it is a companion document to the RI report. Geologic cross-sections and water table maps are included in the RI Report.

192. **Appendix A Volumes and Areal Extent of Contaminated Media:** It would be helpful to show the sub-areas that were used in computations (e.g. Lateral Extent – Upland Area, Former Gas Holder Area, Former Clay Pipe Area) on a figure for reference.

Response

Figures for section 6-1 has been included to show existing conditions at the upper bluff and at Kreher Park.

In addition, volume computations for sediments should be broken down into "contaminated sediments" and "overburden". It is clear from the sediment sampling over time that much of the wood waste was deposited after the releases of MGP wastes occurred. The ultimate disposal/treatment of the relatively clean wood waste overburden will most likely be different than the contaminated sediments.

Response

Based upon interpolation of data from historical borings through the sediments, the RI report describes that the affected area contains approximately 25,000 cubic yards of wood waste. This wood waste mass overlies the bulk of contaminated sediments, and was found to vary from a few inches in the northern perimeter of the affected area, to slightly more than six feet immediately north of the former WWTP. Figures 4-213 through 4-216 in the RI Report show in plan view and on cross sections the distribution of PAHs in the affected area within and below the wood waste layer. These graphics confirm the findings that substantial contamination was measured within the wood waste layer, especially near the shoreline and north of the POTW where the thickest mass was found. As described in responses to earlier comments, the wood waste layer is contaminated at Kreher Park, which is the source for NAPL contamination observed at those park areas beyond the confirmed DNAPL deposits (seep area, coal tar dump and TW-11 area).

The history of the filling of the lakebed seen during operation of the sawmills was concurrent with the startup and expansion of the MGP. Contrary to the conclusion in the comment above, the data confirms that it is not clear from the sediment sampling over time that much of the wood waste was deposited after the releases of MGP wastes occurred.

193. **Appendix A Volumes and Areal Extent of Contaminated Media:** Is the extent of contamination at the Former Gas Holder Area and the Former Clay Pipe Area also based on the where benzene exceeded the RCL? If so, list in assumptions.

Response

The volume estimates for limited removal from these areas are based on the lateral extent of DNAPL in these areas. This includes removal from the unsaturated and saturated zones.

194. **Appendix A Volumes and Areal Extent of Contaminated Media:** Why does the acreage vary for the lateral extent of sediment contamination with total PAHs exceeding 10 ppm? More explanation is needed on how these areas were determined if Total PAHs exceeding 10 ppm was used in all cases, yet the areas vary.

Response

This is explained under the assumptions column in the Table in revised Appendix D1 (formerly Appendix A). The total area where total PAHs in surface sediments are greater than 10 ppm (rounded off from 95. µg/kg @ 0.415%OC) is approximately 16 acres. In Alternative SED-2, the CDF footprint will cover six acres. All sediments in the remaining 10 acres will be dredged and placed in the CDF. In Alternative SED-3 all sediments in the top four feet within this 16 acres will be dredged and removed. However, in some areas all sediments above 10 ppm below the four foot depth also can be removed by dredging an extra two feet. These will also be dredged under this alternative and removed. In Alternative SED-4 all sediments in the 16 acres to 10 feet (the assumed deepest depth of contamination) will be removed.

195. **Appendix C Summary Cost for Siting, Constructing, and Operating a Landfill in Ashland:** The Draft Feasibility Report evaluates several alternatives for addressing contaminated soils, contaminated sediments and impacted groundwater. Alternatives are presented for removal of some or all of the contaminated soil and sediment, which subsequently require disposal.

NSPW owns an industrial landfill facility near Ashland, in Bayfield County, referred to as the Woodfield Landfill. It is currently designed for disposal of ash from the Ashland power plant. Although not noted in Appendix C of the report, use of the Woodfield Landfill should be considered. This option would entail the development of an expansion of the existing landfill (contiguous or non-contiguous). A proposal for development of a landfill expansion at this location would require a significant change from the design of the existing landfill to handle the subject contaminated material. Developing an expansion at this location will require the completion of all steps associated with siting a landfill. Appendix C of the report generally presents the process for siting a landfill. It indicates that siting a landfill for the contaminated material will cost approximately $16 million from the request for an Initial Site Inspection through construction and closure, with 40 years long term care. NSPW also notes an additional $2.5 million for transport of the contaminated material. As mentioned above, this review did not include a detailed evaluation of the cost estimates presented.

Response

As discussed in Section 7.6 of the Alternatives Screening Technical Memorandum, expansion of the Woodfield Landfill has been considered and will be explored further during Remedial Design.

196. **Appendix D General:** The cost estimates do not seem to include costs for some of the key elements described in the text for several of the alternatives. For example, costs for

shoring deep excavations or excavations near buildings do not seem to be included in any of the alternatives. Detailed cost estimates should at least include costs for the key elements described in the text. Further, some alternatives describe several different possibilities and alternate technologies, but it is not always clear what is assumed for cost purposes, and what costs are not included.

Response

Cost estimates for soil remedial alternatives have been revised to address these issues.

197. **Appendix D General:** How were the percentages selected for mobilization/demobilization, engineering, and construction oversight for each alternative?

Response

A mobilization/demobilization cost of 5-percent of capital costs was used for all soil remedial alternatives. The percentages selected for engineering, and construction oversight (15-percent) are based on engineering judgment. These percentages are within range of example percentage values presented in the USEPA's Guide to Developing and Documenting Cost Estimates During the Feasibility Study.

198. **Appendix D General:** Present value costs were calculated for the O&M costs of the sediment alternatives, but not for the soil or groundwater alternatives. Using a discount rate of 7% over 30 years will significantly reduce the present value costs of those alternatives that require long-term O&M.

Response

The use of engineered surface barriers (Alternative S-2) is the only soil remedial alternative with long term O & M costs. Although these long-tern O & M costs for this alternative are low, costs were revised using a 7% discount rate over 30 years in revised Appendix F1. Present value long-term O&M costs have also been calculated for all potential groundwater remedial alternatives in revised tables included in revised Appendix F2.

199. **Appendix D General:** Following the examples from the US EPA's *Guide to Developing and Documenting Cost Estimates During the Feasibility Study*, percentages for mobilization, engineering, construction oversight, and contingency should be applied to the total capital cost separate from the O&M costs, which should have its own percentages applied. Present value cost should be calculated for those components that have costs applied over a couple years or more. This analysis will have the greatest impact for the costs applied over the longest durations.

Response

Remedial cost estimate tables for soil and groundwater remedial alternatives have been revised. Alternative S-2 is the only remedial alternative evaluated for soil that includes long term O&M costs; these costs have been separated from capital costs including mobilization, engineering, and construction oversight. Contingency costs were applied to capital costs, and present value O&M costs are included for the alternatives in revised Appendix F1 (formerly Appendix D).

200. **<u>Appendix D Table D-2, Alternate S2: Containment Using Engineered Surface Barriers</u>:** Should cost be included for removal of the WWTP or for a cap in this area? This was mentioned in the text. If not, then perhaps state in the text that this is not included for cost assumptions.

<u>Response</u>

Cost estimates for the removal of the WWTP are included with Alternative S-2 (engineered surface barriers) and Alternative S-3B (unlimited removal and off-site disposal).

Further, in the text it mentions that a RCRA class C or D cap will be placed over the former coal tar dump area. Presumably, Subtitle D was assumed for cost purposes. This should be stated in the text and on the table, because it will make a significant difference in cost, given that a RCRA subtitle C cap is for a Hazardous Waste landfill. This comment may apply to other alternatives, as well.

<u>Response</u>

Soil contaminated with MGP waste is not a listed hazardous waste and it is exempt from the characteristic hazardous waste determination according to the TCLP test. However, once it is removed it may become a hazardous waste by the characteristics for reactivity, flammability or corrosivity.

The cost estimates for the various on site disposal options do not assume that any of the waste materials will be classified hazardous. Any materials so classified will either be treated on site and rendered non-hazardous, or removed and properly disposed off-site. A Subtitle C hazardous waste landfill and the associated components (i.e, double-lined cap system) are not included with any of the cost estimates. The alternatives assume that asphalt pavement or subtitle D surface barriers (single-lined cap system) will be used.

201. **<u>Appendix D Table D-4, Alternate S3B: Unlimited Removal and Off-site Disposal</u>:** The cost for installation of sheet pile for dewatering (which may be a significant cost) does not seem to be included in Table D-4.

<u>Response</u>

Costs for installing a sheet pipe wall along the shoreline, excavation de-watering, and wastewater treatment are included in the revised table. The revised cost assumes $250,000 for de-watering equipment (i.e. storage tanks and sump pumps) and assumes a flow rate of 20 gpm for 180 days.

202. **<u>Appendix D Table D-4, Alternate S3B: Unlimited Removal and Off-site Disposal</u>:** Is $50,000 sufficient for the dewatering equipment? What number and kinds of pumps/tanks will be used? How was the 5 gpm flow rate determined?

<u>Response</u>

See Response to Comment 200.

203. **<u>Appendix D Tables D-5, D-6, D-7, D-8</u>:** Long-term O&M is not included in the cost, but is mentioned in the text for the key components (periodic inspection and repair of caps).

Response

Alternative S-2 (engineered surface barriers) is the only soil remedial alternative to include long term O&M costs. The remaining remedial alternatives evaluated for soil are removal actions and do not have long-term O&M consequences. Long-term groundwater monitoring costs are included with remedial costs for groundwater.

204. **Appendix D Tables D-6 and D-7:** These alternatives do not seem to include sorting cost to sort out "unsuitable material" that cannot be treated (e.g. cinder blocks and wood waste) from the soil. Is this cost considered with excavation costs?

Response

The tables assume 10% of the total mass will be unsuitable and sent off-site for disposal.

205. **Appendix E Table E-3, Alternate GW3 – Ozone Sparge:** Cost for a pilot test, which is included in the text description, should be included in the cost for this alternative.

Response

Costs for a pilot test have been added.

206. **Appendix E Table E-4, Alternate GW4 – Surfactant Injection and Dual Phase (Vacuum Enhanced) Recovery:** Costs for a pilot test and wastewater treatment plant upgrades are mentioned in the text description of this alternative; these costs should be included in the cost table. In addition, the cost table includes cost for waste water disposal by vac truck, whereas the text description states that the recovered fluids will be treated and disposed by sanitary sewer; please clarify.

Response

This remedial response assumes that the existing groundwater treatment system will be utilized for the on-site treatment of contaminated groundwater recovered by the vacuum truck; treated water is currently discharged to the sanitary sewer. The existing system will continue to operate after surfactant injection and dual phase recovery is complete. Because the influent flow rate will not increase, the system will not be upgraded. The vacuum truck will be used as a mobile vacuum extraction system rather than a fixed based vacuum extraction system, which would require trenching and the installation of lateral piping.

207. **Appendix E Table E-5, Alternate GW5 – Permeable Reactive Barrier Wall:** Include costs for demolition of the WWTP in the cost table, or state in the text that this is not included for cost assumptions. Include costs for obtaining institutional controls, grading, and for PRB reactive material replacement (or state that they are not included in the text).

Response

Although demolition of the WWTP is not needed to implement this remedial response, the cost for building demolition and installation of a clay cap have been included in this revised cost estimate. This cost estimate includes costs for implementing institutional controls, grading, and installation of the PRB wall. There is no indication the PRB wall will need replacement, so replacement costs for the

PRB wall are not included; only items that are included with each remedial response are described in the text.

208. **Appendix E Table E-6, Alternate GW6 – In-situ Chemical Oxidation:** How many oxidant applications are assumed for this alternative? The text indicates that "multiple applications" would be required, and the cost table lists reagent injection on a weekly basis, making it difficult to evaluate. Is it one injection per week? Also, include costs for grading and cap inspections.

Response

Cost estimates assume that approximately two applications will be completed. The first application will be completed in a regular grid pattern over the treatment area, and additional applications will be completed within the treatment area as needed.

Costs for asphalt pavement include grading. Costs for cap inspections are not included for this remedial response because asphalt pavement is included as a site restoration cost, not as a remedial response. Only containment alternatives GW-2A, GW-2B, and GW-5, groundwater extraction alternatives GW-9A, and GW-9B use surface barriers as a remedial response.

209. **Appendix E Table E-7, Alternate GW7 – Electrical Resistance Heating:** Include costs for vapor-phase treatment using carbon adsorption and removal of buried gas holders, as described in the text. Include costs for asphalt/cap inspections.

Response

Costs for vapor phase treatment are included in the revised cost estimates for this remedial response as an upgrade to the existing system. This remedial response also includes passive vent wells. However, costs are not included for removing buried gas holders. This remedial response assumes that the gas holders will remain in place. If removal of buried structures is required, ERH may not be as feasible for soil and shallow groundwater as are removal and ex-situ treatment alternatives described in Section 6.0.

210. **Appendix E Table E-8, Alternate GW8 – Dynamic Underground Stripping:** Include costs for vapor-phase treatment using carbon adsorption, as described in the text. Should costs for electrical heating and underground imaging be included for the Copper Falls Aquifer, as well?

Response

Costs for vapor phase treatment and electrical heating via DUS are included in the revised cost estimate for the Copper Falls aquifer. Because this cost estimate also includes costs for temperature monitoring, costs for underground imaging have not been included.

211. **Appendix E Table E-9, Alternate GW9 – Enhanced Groundwater Extraction:** Include costs for asphalt/cap inspections.

Response

Costs for the annual inspection of asphalt pavement and caps are included in the revised cost estimates.

212. **Appendix F Preliminary Remediation Cost Estimates for Sediment:** The overall costing process seems to be inconsistent between scenarios and incorporate process steps that may be excessive or unnecessary. The FS text provides little information on design decisions specific to each alternative so the decision making process is not entirely clear. Some scenarios call for dewatering and conditioning of the sediment using both filter presses and cement stabilization. Other alternatives specify one or the other. The alternatives should be consistent and specify treatment processes appropriate to the removal method, treatment and disposal processes. Additional information in the report text might be helpful in understanding the decision-making process.

For example in Alternative SED-3A the design calls for mechanical dredging followed by filter press dewatering and then cement stabilization. Since this is a mechanical dredging alternative we can assume the sediment will be at an in place density with little additional water. The sediment will have a relatively high solids content and debris content that will make filter press usage difficult. Cement stabilization is a more appropriate conditioning process. Consideration should be given to dropping the filter press treatment and screening in this alternative for a substantial cost savings.

Alternative 3-C also proposes both filter presses and cement stabilization. If the stabilization is deleted the costs will be reduced.
Alternative-4C also specifies both filter presses and cement stabilization. Unless the consultant can justify otherwise it is recommended that as a hydraulic dredging alternative filter presses are more appropriate and cement stabilization be deleted at an estimated cost reduction.

Wood disposal in roll off boxes has been estimated at $75 per cu. yd. or $128/ ton compared with sediment at $43/ ton. This cost seems very high and in some scenarios approaches the cost of disposal of the sediment.

Landfill disposal costs appear to be estimated too high. The consultant should provide justification for estimating cost based on hauling the waste to Eau Claire instead or other closer alternatives.

Consideration should be given to re-analyzing and submitting the remediation cost analysis for review. The alternatives should propose only as much work as necessary to complete the work described in the alternatives using the most cost effective technologies and approaches.

Response

Costs will be reviewed and more detailed assumptions upon which the costs are based provided so it is more apparent to the reader.

213. **Appendix F General:** Costs in Appendix F are more descriptive and inclusive than Appendices D and E; costs in Appendices D and E should be of consistent level of detail as Appendix F.

Response

Costs for soil and groundwater remedial alternatives have been revised, but not at the same level of detail as the sediment removal options. Remedial alternatives for soil and groundwater have significantly more variability with regard to technologies, but require less detail for FS decision-making. These "dry-land" technologies have been previously implemented and expertise gained at other sites with respect to engineering costs. However, the anticipated complexity for sediment remediation at this site has little precedent. Consequently, design level cost details have been provided to assist with remedial decision-making.

214. **Appendix F General:** It appears as though construction oversight is included twice in the cost – once as Misc Item No 3 and then again as 15% of the total capital cost.

Response

This heading has been corrected in the revised draft FS.

215. **Appendix F Tables F-9 and F-10:** Revise heading of "Mechanical Dredging…" to "Hydraulic Dredging…"

Response

This heading has been corrected in the revised draft FS.